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ABSTRACT

The Eisenhower National Clearinghouse for Mathematics and Science Education (ENC) helps teachers by offering a broad assortment of services that enable them to quickly locate educational resources. This document is one in a series of print catalogs designed to give educators information about curriculum resources available for teaching math and science in K-12 classrooms. Each issue of ENC Focus presents a selection of the Clearinghouse collection focused on a topic of particular interest to math and science teachers. This issue provides information about multicultural approaches in mathematics and science education. A one-page description of each resource includes an abstract of the contents, subjects addressed, grade level, publication date, ordering information including price, authors, and related resources. (ASK)

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Volume 5, Issue 1, 1998

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ERIC FOCUS

For Mathematics and Science Educators

Multicultural Approaches in Math and Science

ED 425 909

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Using ENC to learn more about multicultural approaches in math and science

The Eisenhower National Clearinghouse for Mathematics and Science Education was established to help K–12 teachers locate useful teaching materials. The Clearinghouse collects all types of materials at the National Repository in Columbus, Ohio, at The Ohio State University. ENC makes information available about all of these resources in several ways. For example, this print catalog is one of a series that highlights specific topics and resources in math and science. All of ENC's resources in combination will provide comprehensive information for teachers on a variety of topics, including multicultural approaches.

ENC Online

ENC Online has links to exemplary science and math Internet sites through the Digital Dozen, selected monthly, classroom links, and other educational resources. Some Internet sites are available with information about using multicultural approaches in the classroom. You can find them in two ways: search Resource Finder, or browse through the links on ENC Online. If you have time to browse, you will find all kinds of things you might be able to use in your classroom. ENC Online also links to many of the resources acquired or developed for ENC's CD-ROMs.

ENC CD-ROMs

ENC's CD-ROMs have a variety of previously published documents in electronic format about curriculum issues in math and science education, as well as resources developed by ENC to meet educators' needs. These documents cover curriculum standards and implementation, and include the complete 1989 NCTM *Curriculum and Evaluation Standards for School Mathematics*. TIMSS (Third International Math and Science Study) and Equity are the topics of the two newest ENC CDs, which are available free to schools.

ENC Demonstration Sites

Located throughout the country, these 12 sites can be found at, or work in conjunction with, the 10 Eisenhower Regional Consortia (see inside back cover), at the Capital Collection & Demonstration Site at The George Washington University in Washington, DC, and at ENC. Teachers and other educators can visit or contact the Site in their area for a complete demonstration of ENC's services as well as assistance in locating educational materials and using new technologies.

Teacher contributions to ENC

To create a better service, ENC needs the help of the Nation's educators. ENC Online's Professional Development Exchange offers one place where educators can both submit and search for professional development events and opportunities, such as workshops, conferences, or grant monies. However, this tool will only be useful if educators use and contribute to it. For more information, visit ENC Online at http://www.enc.org.

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U. S. Department of Education	***Office of Educational Research and Improvement***	***Office of Reform Assistance and Dissemination***
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Multicultural Approaches in Math and Science

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To request any issue of the *Focus* series, contact ENC at the address above, or e-mail editor@enc.org. While some issues are out of print, all are available online or on CD-ROM.

Past titles include *Integrating Math and Science, New Approaches to Assessment in Science and Mathematics, Calculator-Active Materials, CD-ROMs and Laserdiscs for Science, Professional Development for Math and Science,* and *Using Children's Literature in Math and Science.*

How to Connect to ENC Online

To connect to ENC Online via the Internet, visit ENC's World Wide Web site (http://www.enc.org/). You can also telnet to enc.org; via modem dial (800) 362-4448 or (614) 292-9040. Set your communication software to VT100 terminal emulation, no parity, 8 data bits, 1 stop bit, and full duplex. Once connected, press <RETURN> to bring up a screen and type c to connect. All the information you need to use ENC is on the screen.

ENC Reference Services

People with questions related to K–12 math or science education can call the ENC Resource Center's reference staff. Services include assistance with locating teaching materials, conducting research, and making effective use of ENC Online and the Resource Finder, ENC's catalog of curriculum resources. Call the Reference Desk at (800) 621-5785 or dial (614) 292-9734. Questions can also be sent via e-mail to library@enc.org.

New ENC CD-ROM

ENC, working with the Equity Task Force of the National Network of Eisenhower Regional Consortia and Clearinghouse (NNERCC) has produced a CD-ROM, *Making Schools Work for Every Child.* This disc serves as a resource for educators who are concerned about creating equitable conditions in which every child can succeed at school. It provides a collection of math and science equity materials to help teachers and administrators acknowledge children's diverse strengths, identify inequities, and improve the ways in which we currently serve students with varied needs.

Among the resources included on the disc are those aimed at strengthening skills in serving students with diverse needs; gaining insights into our cultural frameworks; examining school structures and mechanisms that promote or inhibit the participation of members from diverse communities; examining building, district, State, and Federal policies; strengthening preservice programs' preparation of teachers, guidance counselors, and administrators; forming local learning communities to determine how best to serve students with diverse needs; and examining classroom mathematics and science assessment practices.

The *Making Schools Work for Every Child* CD-ROM is available free to educators through the Eisenhower Regional Consortium in your region. Refer to the inside back cover of this publication for contact information about the Consortium serving your state or territory.

Introduction

America's classrooms are becoming increasingly culturally diverse as the century draws to a close, and educators are turning to new approaches and resources to better address the varied backgrounds and educational needs of their students. These multicultural approaches span disciplines and grade levels and draw from all cultures of the world, enabling students to recognize the important contributions made by people from cultures both different from and similar to their own. By bringing a multicultural awareness into the teaching of mathematics and science, educators can create a learning environment in which students feel their heritage is recognized in the classroom. Such an approach can help students perceive their own connection to science and mathematics, become more confident in their own abilities to do math and science, and develop a greater understanding of other cultures.

This issue of *ENC Focus* brings together a selection of multicultural materials and perspectives. To a greater extent than any previous edition, this issue also incorporates contributions from educators, who share their insights and discuss strategies. We have interviewed four educators from different parts of the country, in both rural and urban settings, to gather their perspectives on the value of a multicultural approach in math and science, and on how they are implementing it in their own classrooms. In selecting materials that support multicultural classroom approaches, we have included resources that connect mathematics and science to their historical roots in various cultures—some as background information (such as *Africa Counts* and *Science for All Cultures*) and others as sources of classroom activities (*Multicultural Science and Math Connections*).

In Section I, Claudia Zaslavsky, author of *Africa Counts: Number and Pattern in African Culture* and *The Multicultural Math Classroom*, offers her insight into how a multicultural approach affects students and enriches curriculum. Section II contains information about some of the many curriculum resources available to help educators learn about and implement a multicultural approach in their own classrooms. This section includes descriptions of related World Wide Web sites.

In Section III, we have provided information on a variety of articles and papers that address multiculturalism in math and science, discussing topics from dealing with bilingualism to creating a multicultural learning environment. Section IV describes some of the many videos and children's literature books available for use in direct classroom instruction.

The resources featured in this issue were selected from the existing collection at ENC. Many new multicultural materials are being developed and we continue to add resources to our repository, so be sure to search our online catalog, Resource Finder, for other multicultural resources not highlighted in this issue. Please let us know of other materials that you would recommend via e-mail at submit@enc.org. We will do everything possible to include them in our collection. ENC is committed to the continuing professional development of teachers and to helping their ongoing efforts to examine and improve their practice.

Searching ENC's Collection of Curriculum Resources

You can get to Resource Finder, ENC's online database of educational materials, from ENC's home page (http://www.enc.org). Three search engines are available for use: Simple Search, No Frames Enhanced, and Enhanced Search.

The Simple Search allows you to search using words, as well as grade level and cost. A sample Simple Search could include Multicultural AND Animals as Search Words, Grade 3, and any cost. The return list includes resources with both "multicultural" and "animals" in the catalog records.

The No Frames Enhanced search allows you to better limit and define your search. In addition to word search, grade level, and cost, limiters such as Resource Type, Subject, and Standards are available. Lists of ENC's controlled vocabulary are provided. For instance, Resource Type includes words such as Children's Literature, Professional Guides, and World Wide Web (WWW) resource. A sample search using No Frames Enhanced could have Multicultural Instruction, Cultural Awareness (if you use more than one subject, the terms need to be separated by a comma) as Subject; 3 as Grade; and Professional Guides as Resource Type. One of the resources in the return list is *Multicultural and Gender Equity in Mathematics Classrooms: The Gift of Diversity* (ENC-011153). The Enhanced Search, which uses frames, features pop-up vocabulary lists.

You can also search by ENC number, a designation we assign to each resource to indicate where it is shelved in our repository. This number can be found in the upper left of the catalog record on your computer, or at the end of the abstract in *Focus*. You can search for specific records in Resource Finder by typing in the ENC number in the Search Words blank. For example, typing in ENC-009981 brings up the record for *Native American Students: Including Indians* (1989), published by Annenberg (see page 16). When contacting ENC about a particular resource, be sure to refer to the ENC number.

For each item in a return list, an icon lets you know what kind of resource it is (for example, videotape, kit, or Web site). Each resource is followed by descriptive text that contains its title, grade range, cost range, and the beginning of the abstract. Clicking on the title brings up the entire record, including the complete abstract, the table of contents, and any evaluations. Availability information is provided so that you can contact the vendor or publisher for more information or to purchase the item.

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Pricing and ordering information were verified in January, 1998 and are subject to change.

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Scientist Within You	3–8	$21.95	12
Multicultural Education	K–12	$328.00	13
Multicultural and Gender Equity in the Mathematics Classroom	K–12	$22.00	13
Exploring Sustainable Communities	9–12	$8.95	14
Teaching Physical Science Through Children's Literature	1–4	$19.95	15
Afterwards: Folk and Fairy Tales	3,4	$12.95	15
Native American Students: Including Indians	K–12	$49.95	16
Reaching All Students with Mathematics	K–12	$15.00	16
Linking Your Y with the World	5–12	$15.00	17
Cultivating a Child's Imagination Through Gardening	K–6	$19.50	17
Science Timelines	K–3	$39.00	18
Science for All Cultures	K–12	$16.50	19
Who's Endangered on Noah's Ark?	K–12	$22.00	20
Of Bugs and Beasts	K–12	$23.50	20
Waterdrum Science	K–6	$34.00	21
Children of the River	6–9	$14.95	22
Learning Activities from the History of Mathematics	9–12	$25.95	23
Africa Counts	1–12	$14.95	24
The Dreamkeepers	K–8	$16.00	25
Keepers of the Earth	K–6	$22.95	26
Keepers of the Animals	K–12	$19.95	26
Keepers of Life	K–9	$22.95	27
Keepers of the Night	K–6	$14.95	27
Celebrating Our Nation's Diversity	K–12	Free	28
The Multicultural Math Classroom	1–8	$23.50	29

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* *Please see record for details.*

Title	Grades	Price *	Page
Creating Culturally Responsive Classrooms	K–12	$17.95	30
Strategy Games of the World	K–12	$39.95	30
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Section I: Professional Development

Bringing the World into the Math Classroom

by Claudia Zaslavsky

Who Does Mathematics?

Throughout the ages, people all over the world have engaged in mathematical activities to the extent of their needs and interests. They all count objects, measure various quantities, and invent calendars and other ways to describe the passage of time; they design works of art, plan buildings, and play games that involve mathematical concepts. Furthermore, they invent terminology that enables them to discuss these activities. But each society, each group, solves these problems in its own way. Very often, new ideas are borrowed from other cultures, just as the numerals with which we calculate so efficiently originated in India and entered Europe through Arabic-speaking Asians and North Africans.

Much of the foundation for the math that our children learn in elementary and middle school was laid in Africa and Asia. More than five thousand years ago, the Egyptians were using a system of written numerals based on grouping by tens, just as we do today. The right triangle relationship, known by the name of the Greek philosopher Pythagoras, was understood by the scholars of Mesopotamia for more than a millennium before Pythagoras was born. That clever calculating device called an abacus is still in use in China, Japan, Korea, and Russia.

Yet my experience tells me that for most young students, math is not concerned with people at all, but rather springs full-blown from the textbook or the teacher's head. By bringing multicultural perspectives into the math curriculum, teachers can enrich students' learning, giving them a broad view of the scope of mathematics and its place in the development of societies. Students should realize that real people in all parts of the world and in all eras of history developed mathematical ideas because they needed to solve the vital problems of their daily existence. This understanding is equally applicable to the lives of students in our own society and our own times.

A Multicultural Math Curriculum

What do we mean by multicultural education? The "cultures" in the term "multicultural" may refer to women and men, to ethnic/racial groups, to geographic regions, to people in specific occupations or age groups. Local communities also have their own cultures, as well as their own issues in which students can become involved.

The mathematics curriculum must be meaningful to all students and must prepare them for the world as it is today, as well as for the world of the future. The most important and most valid mathematics curriculum is one that resonates to the students' own lives and experiences.

Several considerations govern the design of a multicultural mathematics curriculum and its implementation in the classroom:

- Teachers must believe that all students can learn. They should be willing to explore such aspects as learning styles, appropriate materials, and assessment procedures that are relevant to the content of the curriculum.

Claudia Zaslavsky has taught mathematics at several levels, from middle grades to graduate courses for teachers. In 1973, her research into the development of mathematical ideas led to the publication of her book Africa Counts: Number and Pattern in African Culture *(see page 24). Several articles on multicultural education, talks at conferences, and books of activities followed. Through her work, Zaslavsky has celebrated the mathematical genius not only of the African but also of the Asian and Native American cultures, among others. Her most recent book is* The Multicultural Math Classroom: Bringing in the World *(see page 29).*

- The mathematics curriculum must engage students and challenge them to develop their critical thinking skills. "Mathematics as reasoning" is one of the main standards in the mathematics reform movement. Dressing up a routine type of exercise by placing it in an unreal story context does not engage many students, regardless of the ethnic and cultural content.

- The curriculum should promote the sharing of cultural knowledge and encourage respect among the students for one another, as well as for the members of the community and peoples of the world.

- A multicultural curriculum should empower all students by developing their leadership qualities, promoting creativity, and building confidence in their ability to apply mathematical concepts to the problems they encounter.

Mathematics comes alive when students participate in activities that illustrate how mathematical decisions arose from the basic needs of societies. For example, why do people build their homes in certain shapes and sizes and use particular materials? An investigation into styles of building in various cultures provides valuable experiences with shapes and sizes, perimeter and area, estimation and approximation, while at the same time it shows the relevance of mathematics to social studies, art, and other subjects. Students might consider a tipi, an African mud-and-wattle round house, or an Inuit igloo to be "primitive" dwellings compared with an urban apartment house or suburban ranch house. Yet the people who build these homes are using their available materials and technology to the best advantage.

photo by Lynda Tittenington

Cliff palace at Mesa Verde, Colorado

Teachers must be careful that they do not introduce cultural applications as examples of "quaint customs" or "primitive practices." These applications must form an integral part of the mathematics curriculum. They must inspire students to think critically about the reasons for these practices, to dig deeply into the lives and environment of the people involved. It is easy to trivialize the concept of multicultural education by throwing in a few examples as holidays approach. Better not to do it at all!

The multicultural context is relevant to many aspects of the mathematics curriculum. A discussion of the number words and numeration systems of nonEnglish-speaking peoples may do wonders in raising the self-esteem of students who speak these languages, as well as enhancing the understanding of all students. It may come as a surprise that in some languages grouping is by twenties rather than by tens, as it is in English. Games of chance and games of skill, and patterns in art and architecture, are all sources of learning experiences. Some of the richest contributions may come from students and their families.

Is This Another "Add-On?"

Multicultural math education does not imply an "add-on." Rather, it means a different way of involving students in mathematical activities and mathematical thinking.

The reform movement in mathematics education is a reaction to the sad fact that much of the traditional mathematics curriculum had little relevance to the lives of students or to other aspects of school life. Mathematics was not connected to anything. Many students were unable to apply the math they learned in school to solve everyday problems.

Multicultural mathematics education involves meaningful math activities integrated with other subjects, joint planning with teachers of those subjects, use of appropriate literature, performance-based assessment, attention to students' learning styles, and work with families and the community.

The achievement of a genuine multicultural education would require a revision of the whole curriculum, all subject areas, to embrace those groups—women, working people, ethnic/racial groups—whose contributions and place in history have been distorted, marginalized, or ignored completely. I include the issues and problems that the students and their communities face today.

Change takes time, and all the elements of change must work together. Teachers who are responsible for all or most of the subject areas are indeed fortunate. They can weave the study of mathematics into the context of life in colonial America by having their students make quilts and, incidentally, learn that the art of quiltmaking was one of the few means of expression for women in that society. Similarly, the history of calendars fits right in with the study of the solar system and can lead to a discussion of the almanacs of Benjamin Banneker, the eighteenth century self-taught African American scientist and mathematician. The opportunities for interweaving the various disciplines are endless. Increasingly, middle and secondary mathematics teachers also find that their teaching benefits from collaborative lesson planning with teachers of other disciplines.

Students and Multicultural Math Education

People look for affirmation of their cultural heritage. Each individual wants to know, Where do I fit in? In each class and with each group, the teacher can tailor the curriculum to emphasize those aspects that are of the greatest interest to that specific community. Students can take pride in the contributions of their people, and at the same time learn to appreciate what others have accomplished.

Problems may arise as teachers try to implement both the new mathematics content and multicultural perspectives. It may take a while for students who are accustomed to the old drill-and-test curriculum to understand what is expected of them. Teachers must patiently uproot the students' view of mathematics as rote memorization, one right procedure, one right answer, and the teacher as the final authority. Happily, as students take on more responsibility, the teacher's task becomes easier.

Teachers, too, may have to change their attitudes and beliefs about who can learn mathematics. Unsubstantiated claims that girls don't have the "gene" for math, that African Americans are not capable of higher-order learning, that low-income students are not interested in school—or, on the other hand, that Asians are natural math geniuses—have claimed the attention of the media and the public. Teachers are members of our society, and some allow these attitudes to color their relations with their students.

Teachers must be sensitive to their students' feelings. Students who feel that they are not respected by their teachers may believe that their only alternative is to "not-learn." Of course, another reason that students refuse to learn is that the curriculum is irrelevant and they don't see that schooling will lead to anything worthwhile in their lives. Offering these students the opportunity to contribute to the content of the curriculum may be just what is needed to turn them on to math!

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This article includes excerpts from Claudia Zaslavsky's book: The Multicultural Math Classroom: Bringing in the World *(Heinemann, a division of Greenwood Publishing Group, Portsmouth, NH, 1996). Reprinted by permission of the author.*

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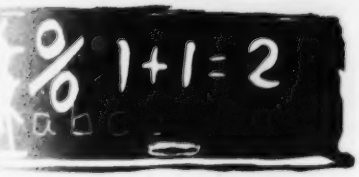
Carolyn Goohs



A Level Playing Field

by Julia L. Harris
ENC Publications Team

America's heritage is one of cultural diversity and the unique challenges posed by that diversity. Nowhere is this multiculturalism more evident than in California, a state that is home to ever increasing numbers of ethnic minorities.

Carolyn Goohs, science lab coordinator for third to sixth grade at San Diego's Grant Math/Science Magnet School, believes that a large part of the state's appeal can be traced to its longstanding efforts to promote a "level playing field" in which everybody—regardless of ethnicity or gender—has the same opportunities to succeed. The philosophy of equal opportunity is one that Goohs sees demonstrated at Grant School, and one that she actively follows in her own teaching.

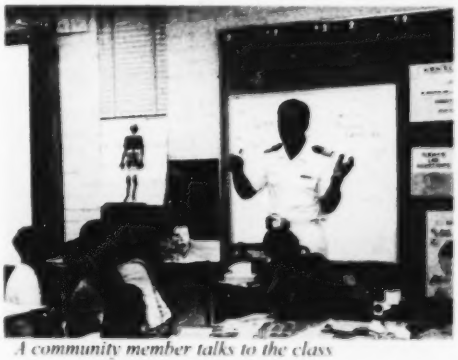
The Magnetism of Math and Science

The Ulysses S. Grant Math/Science Elementary Magnet School, situated in an urban section of San Diego, has been in existence for 13 years. It enrolls 607 students, 57% of whom are minority, and there are approximately 700 students on the waiting list. "It's not uncommon for parents to put their child on the list as soon as he or she is born," Goohs notes. The school's popularity is due to its emphasis on meeting all the national standards for math and science, which it does through a series of enrichment classes in addition to the instruction students receive in their classrooms.

Given the demographics in her school, Goohs has made it a priority to offer her students an educational experience that reflects the rich diversity of the group. Because she uses a hands-on constructivist approach, she relies less upon traditional textbook materials than upon providing a variety of activities and problem-solving situations. In fact, she does not even use a textbook in her teaching, opting instead to write all of her own curricula based on the *California Science Framework*, *Benchmarks for Science Literacy*, and the *National Science Education Standards*.

To keep abreast of changes made in science education, Goohs is a member of a variety of science organizations, including the National Science Teachers Association, California Science Teachers Association, and Computer Using Educators. "I find that the local affiliations of the California Science Project, California Science Implementation Network, and the San Diego Science Educators Association help me keep my objectives in line with the national standards," she says. "Having an open dialog with other teachers is critical to writing your own curriculum."

Among the many science resources that Goohs utilizes are *AIMS* (Activities Integrating Mathematics and Science), *Ranger Rick's Nature Scope*, and *GEMS* (Great Explorations in Math and Science). She has created units that she uses on a rotating basis: one set for her third and fourth graders and another for fifth and sixth.



A community member talks to the class

Three Layers of Learning

Within these units, Goohs uses a three-pronged approach to provide her students with a varied learning experience. She seeks out speakers from the community to give presentations and interact with her students. While she doesn't stipulate that these speakers be of a particular ethnicity or background, she does try to get a diverse range of professions represented in her classroom. For example, heart surgeons and physicians have come in for units on lungs and hearts, an electrician presented for a unit on electricity and magnets, and parents who are actively involved in environmental preservation have led field trips for units on environmental science.

Goohs identifies many of the speakers through an organization in San Diego called Science Alliance, which publishes a

directory of professionals and others who are willing to come and share their knowledge with classrooms. "Community response is amazing when you actually get up the nerve to ask," she laughs. "It's wonderful how many people will take the time to make a difference in a child's education."

Before bringing a speaker into the classroom, Goohs works with her students to help them develop questions and activities with which to engage the speaker. For students who have difficulty with English as their second language, she encourages them to make use of white boards so that they can feel free to modify their ideas. "A lot of students are afraid to write on paper right away," she explains. "It's not a pleasant experience for them in many ways. With the white board, they feel like they can change it at any moment."

1996 Invention Showcase

The students' questions and activities make the interaction with the speakers much more meaningful to them. Goohs relates one experience with a heart surgeon who worked with students on dissecting sheep hearts: "We were studying the human body, and he came in and dissected hearts with one group of children. Then that group of kids worked with other groups of children. We came up with a group of mentor students—sixth graders who worked with the other children in the lower grades."

The second element of Goohs' approach entails the use of films that incorporate professionals of many ethnic backgrounds. "The most important concept in utilizing movies is that it gives students another mode of learning," she notes. "They see a real life connection to concepts that we approach in hands-on/minds-on science activities."

Rather than showing entire movies in class, Goohs generally uses clips that can range from 30 seconds to five minutes in length. She uses these clips to reinforce science concepts that the students are currently learning. After a lesson on telegraphs and Morse Code, for example, when the students had made their own telegraphs and sent messages to each other using the code, she used a 20-second section from the recent blockbuster movie "Independence Day" to further reinforce the important concepts. "In that part of the movie, the Earth was about to be saved by sharing information around the world using Morse Code," she explains. "The students recognized the clip immediately and the concept was exemplified as something they could relate to and would remember. They had made the telegraph, used it, talked about it, and then related the concept to something outside the classroom that they were familiar with."

The third layer in her multicultural curriculum involves highlighting inventors who come from a variety of ethnic groups. Every year, Grant participates in the San Diego County Invention Showcase, which means that all students are required to come up with their own unique invention. To supplement the instruction they receive in their regular classrooms, Goohs uses the science lab time to present what she calls "American Achievers": people who have accomplished something remarkable in science and inventions. Often, the students learn about the inventor through plays or reader's theater. "It's amazing what has been invented by a very diverse group of people that most of us don't even know," she notes.

Goohs is pleased to see how her students have responded to the multicultural emphasis in her science lab. When children are given the chance to work in cooperative groups of their own choosing, for example, Goohs notices that they do not make selections based on race or skin color, but rather on the basis of collaborative compatibility. "They don't really see African American, Caucasian, Hispanic, or Asian," she says. "What they are more interested in is finding the best person to work with."

In whatever approach she is using, Goohs keeps in mind that her primary objective is to make sure all of her students realize that they can do and be anything they want, as long as they work at it. She strives to ensure that all students are given the same opportunities to succeed. "I want them to become aware that everyone should be valued, no matter what skin color they have or what language they speak."

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Section II: Educator Curriculum Resources

Mathematics from Many Cultures, Level A

Grade K

1993

Series: Mathematics from Many Cultures

Publisher

Mimosa Publications
PO Box 26609
San Francisco, CA 94126-6609
Telephone: (415) 995-7150
Toll-free: (800) 646-6721
Fax: (415) 995-7155
E-mail: info@mimosausa.com

1 kit. Order # 12955 **$75.00**

Author

Calvin Irons, James Burnett, Stanley Wong Hon Foon, and Rosemary Retalle Irons

Developed as part of the *Mathematics from Many Cultures* series, this kit integrates multicultural studies and mathematics by encouraging children to describe and compare a variety of familiar objects from around the world. Each kit in the series uses brightly colored big books and their corresponding posters to reinforce mathematics concepts and to help children correlate these concepts with many cultural backgrounds and experiences. In this kit, six investigations provide lessons and activities in which students compare dolls from around the world, discover the mathematical elements of musical instruments from a variety of African cultures, and examine Native American picture signs that use geometric shapes. The children also play counting games and explore patterns in art and jewelry from North America, Mexico, Australia, New Zealand, and Sri Lanka. The big book introduces each investigation through a two-page spread with color photographs of the dolls, musical instruments, and artwork discussed in the lessons. The teacher's guide provides three related activities and discussion questions for each investigation. In sample activities, students thread beads on strings to create patterned necklaces; use materials such as clothespins, empty boxes, and colored paper to create their own designs; and go outdoors to play a variety of hopscotch games. The guide also provides introductory and historical notes and includes blackline masters of student handouts. A Spanish language version is also available. (Author/LCT) [ENC-011167]

► Related Resources

Multicultural Mathematics: Posters and Activities

These 18 posters for grades 7 and 8 cover such topics as ancient systems of numeration and multiplication, Arabic geometrical patterns and designs, strategy games and puzzles, and tangrams. The activity booklet contains complementary exercises and references to instructional resources. Reproducible masters for one or more of the activities follow the poster page. The authors suggest that mathematics teachers involve their colleagues, especially art and social studies teachers, in designing instructional activities that relate to the various poster themes. [ENC-004669] National Council of Teachers of Mathematics, toll-free: (800) 235-7566

Multicultural Classroom Posters

Illustrating mathematical methods from different countries and during different time periods, this set of posters gives students in grades 4–12 a brief history of the development of mathematical counting and arithmetic operations. Ranging from approximately 2000 B.C. in China to 20th century Japan, the posters use pictures and short articles to describe how mathematics concepts were initiated and integrated into daily life. Sample articles explain how Navajo Native Americans integrate math into rug patterns and how Europeans display math in Gothic cathedrals by mathematical inscriptions on stained class windows. [ENC-005752] Key Curriculum Press, toll-free: (800) 338-7638

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Agnesi to Zeno: Over 100 Vignettes from the History of Math

1996

Grades 9–12

Publisher

Key Curriculum Press
1150 65th Street
Emeryville, CA 94608-1109
info@keypress.com
Telephone: (510) 548-2304
Toll-free: (800) 338-7638
Fax: (800) 541-2442
http://www.keypress.com

1 text: ISBN 1-55953-107-X; Order # 53107
$24.95

Author

Sanderson M. Smith

Standards

NCTM Curriculum and Evaluation Standards (1989), Content standards: Grades 9–12

Funding

Council for Basic Education (CBE) in Washington, DC

Written to illustrate the cultural, historical, and scientific evolution of mathematics, this book emphasizes communication in the classroom, a concept addressed by the National Council of Teachers of Mathematics (NCTM) *Curriculum and Evaluation Standards* (1989). Activities that focus on communication include writing, in-depth research, and class discussion. These activities reinforce the fact that mathematics does not stand alone, but influences and is influenced by other disciplines. The book outlines the continuum of mathematical development, starting with counting in Mesopotamia to the present day topics of Escalante, chaos, and fractals. It contains more than 100 vignettes to introduce students to math history; these vignettes are designed to serve as an entry point for research projects or for a focused development of one or more related mathematical concepts. Each vignette contains a Related Reading section that provides further information on the vignette's main theme. An Activities section in each vignette encourages student research, writing, and completion of problems. (Author/LDR) [ENC-006398]

► Related Resource

Teaching Mathematics in the Multicultural Classroom: A Resource for Teachers and Teacher Educators

Designed to be used in mathematics teacher education courses and schools, this book focuses on making teachers, teacher educators, and leaders of inservice education courses aware of cultural and linguistic factors in the learning and teaching of mathematics. The book provides ideas, sample lessons, and activities that teachers can use in the classroom. Many of these strategies are crafted to benefit both native English speakers and ESL students. Other materials address the needs of preservice teachers who lack proficiency in hearing and speaking English, or in using English in a mathematical context. A section of worksheets and overheads is provided, as well as an annotated bibliography. [ENC-005893] Australian Association of Mathematics Teachers Inc. (Adelaide, Australia), e-mail: aamtinc@nexus.edu.au

BEST COPY AVAILABLE

Scientist Within You: Experiments and Biographies of Distinguished Women in Science

1996

Grades 3–8

Series: Scientist Within You

Publisher

ACI Publishing
PO Box 40398
Eugene, OR 97404-0064
Telephone: (503) 689-2154
Toll-free: (800) 935-7323
Fax: (541) 689-1369
alphaci@aol.com

1 text: $21.95

Drawing from a variety of cultures and fields, this book highlights for students in grades 3–8 women's achievements in science and mathematics from the first century AD to the present. It includes such professions as paleontologists, geologists, astronomers, and mathematicians. Also discussed are chemists, physicians, and atomic physicists. The examples used in the book represent European, African American, Native American, Mexican American, and Asian cultures. The noteworthy accomplishments of these women are conveyed to students through hands-on experiments and activities. The book comprises 25 discovery units, each of which features a hands-on activity, a bibliography, a newsletter, and biographical information about the scientist profiled. This volume is the revised edition of the single-volume first edition. (Author/AD/SXA) [ENC-003618]

Author

Rebecca Lowe Warren and Mary H. Thompson

Related Resources

ENC has other volumes of this series in its collection, including:

Scientist Within You: Experiments and Biographies of Distinguished Women in Science, Instructor's Guide
This instructor's guide, developed for grades 3–8 as part of the *Scientist Within You* series, provides units that highlight the work of 23 women scientists and engineers from a variety of disciplines and cultures. In a sample unit, as students learn about research chemist Dr. Reatha Clark King, they observe a chemical reaction in which vinegar and baking soda are mixed to produce carbon dioxide, which then extinguishes a candle. Each unit includes a timeline and newsletter of the scientist's life, as well as background information for teachers and bibliographic references. [ENC-003617] (See above for contact information.)

Scientist Within You: Women Scientists from Seven Continents, Biographies and Activities (Volume 2)
For grades 5–10, this book highlights the lives and accomplishments of women in science and mathematics from 1868 to the present. Several professionals are profiled from each of the seven continents. Each profile includes a hands-on activity for students related to the accomplishments of the featured scientist. Facts and curiosities are provided for each continent. An additional chapter uses the examples of scientists to foster career exploration. [ENC-003619] (See above for contact information.)

Multicultural Education

Grades K–12

1994

Publisher

Association for Supervision and Curriculum Development (ASCD)
1250 North Pitt Street
Alexandria, VA 22314-1453
Telephone: (703) 549-9160
Fax: (703) 299-8631
Toll-free: (800) 933-2723
E-mail: member@ascd.org
http://www.ascd.org

1 kit: Order # 494033 ***$328.00*** *(ASCD member),* ***$398.00*** *(non-member)*

Author

Leonard Davidman, Marci D'Arcangelo, John M. Checkley, and Jim Oppenheimer

Evaluation

Certificate for Excellence at U.S. International Film and Video Festival; CINE Golden Eagle; Award of Merit from National School Public Relations Association

Designed to provide participants with a vision of the content and importance of multicultural education, this video-based staff development program was developed for administrators, teachers, parents, school board members, and corporate and community leaders. The video looks at three schools and defines multicultural education in the context of their philosophy, curriculum, parent and community involvement, and staff development practices. The schools studied are: Ralph Waldo Emerson Elementary School and Roger Temple Intermediate School in East Los Angeles and Falls Church High School in Northern Virginia. Teachers and administrators from the three schools discuss in interviews the critical issues that their schools face and the ways in which multicultural education helps them deal with those challenges. The video also shows classrooms, school-wide programs, and outreach activities. The facilitator's guide presents workshop activities in which participants can share their understanding of multicultural education and compare their beliefs and strategies to those discussed in the video. Masters are also provided for handouts, self-assessment, and overhead transparencies. An accompanying book, *Teaching with a Multicultural Perspective*, links the idea of multicultural education to the concept of effective teaching. It presents an integrated multicultural model of curriculum and instruction, with practical teaching tools for both veteran and prospective teachers. (Author/LCT) [ENC-011150]

Multicultural and Gender Equity in the Mathematics Classroom: The Gift of Diversity

Grades K–12

1997

Series: NCTM Yearbook, Vol. 1997

Publisher

National Council of Teachers of Mathematics (NCTM)
PO Box 25405
Richmond, VA 23260-5405
Telephone: (703) 620-9840
Fax: (703) 476-2970
Toll-free: (800) 235-7566
E-mail: orders@nctm.org
http://www.nctm.org

1 text: ISBN 0-87353-432-8; Order # 633
$22.00

Author

1997 Yearbook editor, Janet Trentacosta; general Yearbook editor, Margaret J. Kenney

This NCTM 1997 Yearbook envisions how research and classroom practices related to multicultural diversity and gender equity can enhance mathematics programs for all students regardless of their gender, race, ethnicity, or socioeconomic situation. The book contains 45 articles from diverse perspectives that address relevant issues and offer models that exemplify the vision. The articles are organized into five sections. Part One introduces general issues and perspectives related to multicultural and gender equity. The papers in Part Two describe classroom cultures that capitalize on the diversity that is available in every classroom and show how classrooms can offer effective mathematical programs for all students. Papers in Part Three provide examples of curriculum, instruction, and assessment, and describe how these factors influence equity in the mathematics classroom. Part Four addresses some specific professional development activities, including one involving preservice teachers, and two others related to increasing family involvement. The final section addresses challenges for the future. Each article includes bibliographical references. (Author) [ENC-011153]

Exploring Sustainable Communities: Comprehensive Coursework on the Global Environment

1997

Grades 9–12

Series: Teacher's Guide to World Resources

Distributor

World Resources Institute (WRI)
Publications
Hampden Station
PO Box 4852
Baltimore, MD 21211
Telephone: (401) 516-6963
Toll-free: (800) 822-0504
http://www.wri.org

Teacher's guide: ISBN 0-7872-3648-9 $8.95

Publisher

Kendall Hunt Publishing Company

Author

Mary Paden, Roseanne Price, Sarah A. Snyder, Carolina Katz

Funding

Geraldine R. Dodge Foundation; United States Agency for International Development (AID), Bureau for Humanitarian Response; Office of Private and Voluntary Cooperation

Standards

Goals 2000

Part of the *Teacher's Guide to World Resources* series, this guide contains seven lessons that help students examine global trends in urbanization. Each book in the series offers a multidisciplinary unit that draws on skills and knowledge from geography, civics, social studies, science, mathematics, and global or multicultural studies. In the first lesson of this unit, students learn about the process of change by looking back at what has happened to their community over the past 50 years, and then by envisioning the advantages of sustainable communities. Students also brainstorm together to create a vision of an ideal community and recognize how different cultural backgrounds may lead to different choices. The teacher's guide contains teaching materials and suggestions for seven to 10 class sessions. Each lesson contains objectives, instructions, a lesson plan, enrichment activities, student handouts, and overhead transparency masters. The lessons are indexed to the Goals 2000 voluntary national standards. Bibliographic and Internet resources are provided. An optional packet of color transparencies is also available. (Author/LCT) [ENC-011146]

Related Resources

ENC has other volumes of this series in its collection, including:

Two Giants: China & India

This unit, developed for grades 9–12, examines some of the challenges faced by two rapidly growing nations: China and India. Students learn about each nation's history, culture, and major resource issues, and compare the Chinese and Indian views on social and global issues to western perspectives. Additional topics covered include populations, cities, food production and agriculture, and energy. After completing this unit, students should be able to identify the significant developmental and environmental problems faced by China and India, describe some ways in which India and China differ from the United States and Canada, and discuss how India and China can cope with their increasing populations. [ENC-008324] (See above for contact information.)

Women, Equity, and Sustainable Development

Womens' education and cultural roles are here linked with resource management, family size, and sustainable development around the world. Before considering gender equity on a global scale, students look at equity in familiar settings: their own classroom and school. The lesson then expands to discuss inequity between men and women in terms of school enrollment, literacy, health, and earning power in countries around the world. Students apply their learning by selecting from two case studies that portray the lives of poor women: one in a village in India and one in rural Ghana. [ENC-008333] (See above for contact information.)

BEST COPY AVAILABLE

Grades 1–4

Teaching Physical Science Through Children's Literature: 20 Complete Lessons for Elementary Grades

1996

Distributor

McGraw-Hill
Orders
PO Box 543
Blacklick, OH 43004-0543
Toll-free: (800) 722-4726
Fax: (614) 860-1877

1 text: ISBN 0-07-064723-2 **$19.95**

Publisher

Learning Triangle Press

Author

Susan E. Gertz, Dwight J. Portman, Mickey Sarquis

Standards

National Science Education Standards (NSES) (December 1995), Content standards: K–4
Benchmarks for Science literacy (1993)

Funding

National Science Foundation (NSF); Ohio Board of Regents; Eisenhower Program

The lessons in this book use children's fiction and nonfiction books to teach hands-on, discovery-oriented physical science in the classroom. They are grouped into three sections based on the Physical Science Content Standards for Grades K–4 from the *National Science Education Standards* (1995): Properties of Objects and Materials; Position and Motion of Objects; and Light, Heat, Electricity, and Magnetism. In a sample lesson that features the book *The Black Snowman*, students explore the cultural meanings of the word "black" and use chromatography to discover that there is more to many black pigments than meets the eye. Each lesson includes a motivational introductory activity, a bridge to the science activity, and a detailed procedure for the science activity itself, as well as background information and extension activities that incorporate writing, art, and multicultural lessons. Additional resources and bibliographic references are also provided. The authors recommend using diverse assessment methods in addition to paper and pencil tests, including journals, performances, and portfolios. The book is illustrated with black and white photographs and line drawings. In the appendices, readers will find an alphabetical list of the books used in the guide and references to professional development centers in science education and children's literature. (Author/LCT) [ENC-010989]

Grades 3, 4

Afterwards: Folk and Fairy Tales with Mathematical Ever Afters

1997

Publisher

Cuisenaire Company of America, Inc.
Orders
PO Box 5026
White Plains, NY 10602-5026
E-mail: info@cuisenaire.com
Toll-free: (800) 237-0338
Fax: (800) 551-7637
http://www.cuisenaire.com

1 text: ISBN 1-57452-026-1, Order # EN501-036124 **$12.95**

Author

Peggy Kaye

Nine collections of multicultural fairy tales and folk tales are highlighted in this workbook, which also provides related math activities that involve thinking skills. The collections, which are drawn from all over the world, include trickster tales, humorous stories, and narratives of love, sacrifice, and bravery. Readers meet an evil magician, a wicked witch, a flying horse, and a clever giantess. Each tale is followed by four or more thought-provoking problems that focus on mathematical strategies and use manipulatives. In one tale, for example, a girl's kind heart and generous nature help her to escape from an evil witch. She decides to create a "spell repellent" so that she never has to worry about that witch again. The repellent must have exactly 100 centiliters of liquid composed of at least six different ingredients. To create the perfect repellent, she is faced with the problem of picking the right amount of each liquid. Most of the workbook's activities are printed on reproducible student pages. (Author/LDR) [ENC-009720]

Native American Students: Including Indians

Grades K–12

1996

Distributor

Corporation for Public Broadcasting
The Annenberg/CPB Math and Science Collection
Dept C-96
PO Box 2345
South Burlington, VT 05407-2345
Toll-free: (800) 965-7373
Fax: (802) 864-9846

1 videotape and guidebook: ISBN 1-55946-954-4
$49.95
Note: Add 8% for shipping/handling

Publisher

Montana State University-Bozeman, Annenberg/CPB Math and Science Project

Author

Director and editor, Terry Macy

Standards

NCTM Curriculum and Evaluation Standards (1989)

Series: Mathematics and Science for All

The intent of this video and accompanying resource book is to show why reform is necessary in mathematics and science education for Native American students. The *Mathematics and Science for All* series documents the collaboration of seven mathematics and science education reform projects in Montana. These projects focus on specific groups of students and/or grade levels: underserved Native Americans, students with special needs, and rural students. The three programs explored in this video are Systemic Teacher Excellence Preparation (STEP), American Indians in Mathematics (AIM), and Minority Apprenticeship Program (MAP). STEP initiates change at all levels in the preparation of K–12 mathematics and science teachers by placing student teachers in innovative classrooms and connecting them with mentors who emphasize strategies that promote learning for all. AIM brings Native American students and secondary teachers to a summer institute on mathematics and science, with the goal of creating effective mathematics learning communities in classrooms, schools, and reservations in the Rocky Mountain-Plains region. MAP, part of the American Indian Research Opportunities initiative, involves Native American students in a six-week laboratory-based research project that provides precollege preparation and work-related experiences. Suggestions for teaching across cultures include integrating the backgrounds and experiences of students into lessons and using portfolio assessment. The video also recommends implementing cooperative learning and recruiting Native American science and mathematics teachers. (Author/LDR) [ENC-009981]

Reaching All Students with Mathematics

Grades K–12

1993

Publisher

National Council of Teachers of Mathematics, Inc.(NCTM)
Orders
PO Box 25405
Richmond, VA 23260-5405
Telephone: (703) 620-9840
Toll-free: (800) 235-7566
Fax: (703) 476-2970
orders@nctm.org
http://www.nctm.org

1 text: ISBN 0-87353-357-7; Order # 493
$15.00

Author

Edited by Gilbert Cuevas and Mark Driscoll

Standards

NCTM Curriculum and Evaluation Standards (1989); NCTM Professional Standards (1991)

In this collection of stories, precollege mathematics teachers describe their attempts to reach all students. The stories range from a small movement away from traditional teaching approaches to radical departures from the status quo. Some of the radical approaches resulted from applying either the *Curriculum and Evaluation Standards for School Mathematics* (1989) or the *Professional Standards for Teaching Mathematics* (1991). The first section, "A Global View," presents the obstacles to and requirements for successfully meeting the challenge of giving all students equal opportunity to learn. In "Changing What Students Learn," the focus is on how the mathematics curriculum is being changed to accommodate traditionally underrepresented student groups. This section also describes how some teachers are implementing a variety of learning strategies. The underlying theme in "Changing How Teachers Teach" is the development of communication skills in the mathematics classroom. It discusses language features that teachers should be familiar with and strategies for improving classroom discourse. (Author/LDR) [ENC-008513]

Linking Your Y with the World: An Instructor's Guide for Global Environment and Development Education

Grades 5–12

1993

Publisher

Frost Valley YMCA
2000 Frost Valley Road
Claryville, NY 12725-9600
Telephone: (914) 985-2291
Fax: (914) 985-0056

1 text: ***$15.00***

Author

Written by Kathleen M. Haskin; illustrated by Leigh Draper and Christine Peckham

Funding

Geraldine R. Dodge Foundation; United States Agency for International Development (AID); Development Education Program

Developed for instructors at resident outdoor environmental education centers, this curriculum guide tackles tough issues through familiar and realistic outdoor teaching formulas. It is divided into two sections, one covering cultural awareness and the other concerned with issues about developing countries. Lesson plans and activities attempt to incorporate international ideas, critical thinking skills, and problem solving experiences into already existing programs. For some of the activities, the students learn greetings in other languages, try new foods from different areas of the world, and record examples of common products that are produced around the world. In other activities, students learn water carrying techniques of people in developing countries, participate in a biodiversity game show, and develop choices and goals that will ultimately improve their communities in some way. Also included in this guide is a list of references and resources. (Author/CCM) [ENC-008560]

Cultivating a Child's Imagination Through Gardening

Grades K–6

1996

Publisher

Teacher Ideas Press
PO Box 6633
Englewood, CO 80155-6633
Telephone: (303) 770-1220
Toll-free: (800) 237-6124
Fax: (303) 220-8843
http://www.lu.com/tip/

1 text: ISBN 1-56308-452-X ***$19.50***

Author

Nancy Allen Jurenka and Rosanne J. Blass

Organized around a gardening theme, this book uses children's literature to introduce students to multicultural literature, ecology, and the impact of plants on the environment. It also touches on world economics and politics. The book contains 45 lesson plans, each of which focuses on a specific book about gardening and offers activities designed to enhance creativity and build literacy skills. Chapters cover themes such as gardens around the world, plants, folk tales, and special herb, prehistoric, or native gardens. The book also introduces students to famous gardeners, including George Washington Carver and Beatrix Potter. Each lesson incorporates a book-sharing time and activities that integrate gardening, language arts, and creative art. An added bonus is that every lesson includes a recipe for a treat. Lessons also feature a poetry reference, a word game, and a list of supplementary reading materials. Sample activities ask students to build a bird house, use landscape design templates and graph paper to design a garden, and identify endangered plants in their community. An annotated bibliography is also included. (Author/LCT) [ENC-008702]

Science Timelines: A Multicultural Resource Set A

1997

Grades K–3

Series: Science Timelines

Distributor

Rigby
Customer Service
PO Box 797
Crystal Lake, IL 60039-0797
Toll-free: (800) 822-8661
Fax: (800) 427-4429
http://www.rigby.com

1 set: Order # 340757 ***$39.00***

Publisher

Mimosa Publications

Author

Michael Bentley, David Ingham, Xiangyi Mo

This kit contains a series of colorful posters and a matching big book designed to help children recognize and value the contributions made by different cultures to our current science and technology. The materials also highlight achievements that have made each culture unique and provide a tool for linking science with other curriculum areas. Each poster or big book page features a theme, such as homes and houses, working with clay, and head wear. Each theme is illustrated by photographs of objects, people, and buildings from around the world and in different time periods, along with a brief description and a set of critical thinking questions. The posters are identical to the big book pages, and there is an additional poster of a world map that shows where all of the cultural areas discussed in the book can be found. An accompanying teacher's guide suggests introductory activities, such as using the story of the three little pigs as a springboard to a discussion of building houses. Also featured are background information on the items pictured, links across the curriculum, and blackline masters of activities that the students can do in class using simple materials. These activities include experimenting with different amounts of water in dough, classifying tools, and making butter. The materials are designed to be a flexible resource that allows study of a single topic or expansion into an entire unit involving multiple curriculum topics. (SSD/Author) [ENC-011079]

Related Resources

ENC has other volumes in this series in its collection, including:

Science Timelines: A Multicultural Resource, Set B
Some of the themes covered in this set include wind and water, shoes, and transportation. The accompanying teacher's guide contains introductory classroom activities, such as examining glue, staples, and tape as some of the different ways in which paper is joined. Additional activities include making pinwheels and sailing ships, designing a toy, and comparing animal tracks. [ENC-011080] (See above for contact information.)

Science Timelines: A Multicultural Resource, Set C
This kit, suitable for students in grades 3–5, discusses topics such as observing the skies, moving across the water, and early farming. At the bottom of each page is a timeline showing related key developments in history. In the teacher's guide are suggested activities, such as having students walk around their neighborhood observing different types of wheels and how they are used. Other activities involve experimenting with plant growth, investigating levers, and examining ways to preserve foods. [ENC-011081] (See above for contact information.)

Science for All Cultures: A Collection of Articles from NSTA's Journals

1993

Grades K–12

Publisher

National Science Teachers Association (NSTA)
The Science Store
1840 Wilson Blvd
Arlington, VA 22201-3000
Telephone: (703) 243-7100
Toll-free: (800) 722-6782
Fax: (703) 522-6091
E-mail: science.scope@nsta.org

1 text: ISBN 0-87355-122-2, Order # PB109X
$16.50

Author

Compiled by Shelley Johnson Carey

Citations

Hooten, Joseph R., Jr. [University of Georgia, Athens, GA]. Publications. The mathematics teacher. *Vol. 87, No. 8, p. 655 (November 1994).*

Newman, Claire M. [Queens College of the City University of New York]. Reviewing and Viewing: New Books. Teaching children mathematics. *Vol. 1, No. 3, p. 196 (November 1994).*

This resource was reviewed for and included in the 1996 publication Resources for Teaching Elementary School Science *(ENC-001371), a publication of the National Science Resources Center (NSRC) that lists effective hands-on, inquiry-based curriculum materials for grades K–6.*

Through this collection of articles, readers will gain a basic understanding of multicultural science education, its scope, and implications for teacher education. The articles also contain suggestions for using a multicultural approach as an instructional process. The compilation addresses the underrepresentation of female, Hispanic, Native, Asian, and African American students in science and the need to implement multiethnic and multiracial curricular instructional practices. In addition, the scientific achievements of many non-European cultures are highlighted. Some of the articles explore ways of helping students understand the contributions that all cultures have made, and will continue to make, to science. (Author/RA) [ENC-003666]

Related Resource

ENC has other multicultural resources from NSTA, including:

Learning English Through Science: A Guide to Collaboration for Science Teachers, English Teachers, and Teachers of English as a Second Language
This booklet describes general strategies for teaching all classes that include limited English proficient (LEP) students. It provides specific methods teachers can use to prepare LEP students for reading science materials, as well as activities that can be used in teaching them science. The booklet also includes suggestions for dealing simultaneously with science skills and concepts, and with those language skills most fundamental to science comprehension. [ENC-001937] (See above for contact information.)

Grades K–12

Who's Endangered on Noah's Ark? Literary and Scientific Activities for Teachers and Parents

1992

Publisher

Teacher Ideas Press
PO Box 6633
Englewood, CO 80155-6633
Telephone: (303) 770-1220
Toll-free: (800) 237-6124
Fax: (303) 220-8843

1 text: ISBN 0-87287-949-6 **$22.00**

Developed for students of all ages, this book discusses 10 animals that are or have been threatened: wolves, bears, elephants, tigers, leopards, California condors, northern spotted owls, bald eagles, whooping cranes, and alligators. The folk tales that introduce each chapter are drawn from many different cultures and traditions. Each tale is followed by activities investigating the animal's environment and current status, plus activities involving art, literature, writing, and drama. All sections include a description of the animal's physical characteristics, behavior, and habitat. Other pertinent information includes its historic range, current distribution, and status as an endangered species. A bibliography for additional reading is included at the end of each chapter. (Author/KSR) [ENC-002884]

Author

Glenn McGlathery and Norma J. Livo; illustrated by David Stallings

Grades K–12

Of Bugs and Beasts: Fact, Folklore, and Activities

1995

Learning Through Folklore Series

Publisher

Teacher Ideas Press
PO Box 6633
Englewood, CO 80155-6633
Telephone: (303) 770-1220
Toll-free: (800) 237-6124
Fax: (303) 220-8843

1 text: ISBN 1-56308-179-2 **$23.50**

Students of all ages can read this book for profiles of nature's least-liked animals, such as reptiles, bats, and slugs, and other creatures. Each profile describes the vital roles these creatures play in the global ecosystem. The book's three sections are organized to reflect the three possible habitats of air, water, and land. For each of the animals, the book presents related folk stories and folklore illustrating how different cultures perceive these animals and a natural history that describes the animal and its habitat, range, and interactions with other organisms. Also provided are learning activities and problem-solving projects for the classroom, library, or home. These activities can be done on an individual basis, as a class, or in small groups. In addition, the appendices detail some exotic and bizarre foods and provide information about the classification of the various organisms. Answers are provided to puzzles found in the activity sections, and a glossary defines specialized terms. (Author/RA) [ENC-002885]

Author

Lauren J. Livo, Glenn McGlathery, Norma J. Livo; illustrated by David Stallings; photography by Lauren J. Livo, Steve Wilcox

Waterdrum Science: Science Through American Indian Arts and Culture

1994

Grades K–6

Distributor

Creative Education Consulting
1946 Anthony Lane
Chino Valley, AZ 86323
Telephone: (520) 636-9790

1 text: ISBN 0-9642898-0-6 ***$34.00***
Note: Includes shipping handling

Publisher

Larchmere Ltd.

Author

Carolyn A. Petty

Teachers can use this activity book as a resource to help them incorporate American Indian science, art, and culture into their lessons. It includes integrated hands-on activities in life, Earth, and physical sciences from a Native American perspective. Throughout the activities, students learn about animal behavior and adaptation, body systems, plants, and insects, as well as heredity and classification. They also discover rocks, oceans, Earth layers, weather and climate, and the solar system. In addition, they are given the opportunity to examine a variety of physical phenomena, such as work and motion, waves, and magnetism, as well as optics, electricity, and communication. For each activity, the book provides background information, procedures, and activity sheets. References are given at the end of the book. (Author/RA) [ENC-006230]

Related Resources

ENC has a number of resources designed to help educators incorporate Native folklore and legends into classroom science instruction, including:

Tales from the Bird Kingdom: A Reference Collection of More than 160 Legends and Pourquoi Stories about the Creation, Naming, and Characteristics of Birds

Named for the French word meaning "why," this collection of tales is drawn from cultures all over the world. They explain how birds were created, how they were named, or how they acquired a characteristic, color, or distinguishing movement. For example, the tale of the nightingale relates how, on the night of the nativity, a small bird was awakened by the singing of angels. Following the music to the manger, it sang with the angels; the beauty of its song is still characteristic of nightingales' songs today. The stories are given in skeleton form and may be fleshed out with personal touches. Intended for use while bird watching, the book includes blank pages for field notes, sketches, photographs, or additional pourquoi stories. [ENC-008548] Pourquoi Press, telephone: (419) 227-2516

Tales from the Plant Kingdom: A Reference Collection of More than 160 Legends and Pourquoi Stories about the Creation, Naming, and Characteristics of Plants

These pourquoi stories, also gathered from world cultures, explain how plants were created and named, how they came to take on particular attributes, and why they resemble other creations. In the tale of the sunflower, for example, a water nymph named Clytie fell in love with Apollo, the sun god, who did not return her love. Clytie refused to eat or drink, wasted away to nothing, and sank into the ground. She rose up again as a sunflower whose face follows the path of the sun to this very day. It is recommended that the actual plant be used and that the story be told in an outdoor setting. Although children may enjoy some of the stories, the selections should be preread for age appropriateness. [ENC-008549] Pourquoi Press, telephone: (419) 227-2516

Children of the River

1993

Grades 6–9

Series: New Explorers: Our Fragile Earth

Publisher

Public Media Education
5547 North Ravenswood Ave
Chicago, IL 60640-1199
Telephone: (773) 878-2600 ext. 354
Toll-free: (800) 343-4312
Fax: (773) 878-8406

1 teacher's guide: Order # 023859 ***$14.95***
1 videotape: Order # 4260594 ***$14.95***

Author

Kurtis Productions, Inc.; WTTW, Chicago

Funding

AMOCO Corporation; Waste Management, Inc; United States Department of Energy (DOE)

Developed for broadcast on PBS, this series of videos focuses on the research of several new explorers who are on the cutting edge of scientific discovery, extending the frontiers of science, nature, and environmental conservation. The goal is to introduce students to science as a career possibility for their own lives. Each episode includes a teacher's guide with hands-on activities that can be done either in the classroom or on a structured field trip. These activities are also designed to give students experience with projects that parallel or complement those of the scientists in the video. This episode profiles the people of Walpole Island, a Native American reservation in Canada, where the waters appear to be contaminated by chemicals from across the river. With the help of local teachers, environmental education expert Dr. Bill Stapp introduces his Global Rivers Environmental Education Network (GREEN) to the schools of Walpole Island, teaching students how to determine the quality of water in the river. These young citizens are learning to use their test results to support their claims when facing industry and community leaders, and will continue, year after year, to take action on the river's behalf. The teacher's guide, developed for grades 6–9, provides activities that cover the topics of water treatment, indicators of water quality, recreation, and transportation. Topics also include the river as a food source, possible river contaminants, and river dynamics. (Author/KSR) [ENC-001134]

Related Resources

ENC has other videos of this series in its collection, including:

Voices in the Stones

In this episode, Linda Schele from the University of Texas in Austin travels to Copan, Honduras to study the ancient Mayan civilization as part of a cooperative effort of scientists, archeologists, architects, and artists. Schele, an expert on ancient inscriptions, images, and symbols, has revolutionized understanding of the Mayan civilization. The activities in the teacher's guide, developed for grades 3–12, highlight aspects of the Mayan civilization such as its culture, art, religion, language, science, and mathematics. The activities allow students to discover the connections between ancient and modern Maya. [ENC-001186] (See above for contact information.)

A Twentieth Century Medicine Man

Ethnobotanist Mark Plotkin collects plants from deep inside the Brazilian rain forest with help of the tribal shaman and other men of the Tirilo Indian tribe. These plants, many of which have been used by natives for centuries to cure their health problems, will be tested as possible cures for cancer and other diseases at the National Cancer Institute. The activities in the teacher's guide, developed for grades 4–8, examine the people, the animals, and the plants of the rain forest and the delicate ecological balance in which they coexist. Art, language arts, theater, and social studies activities are integrated with science to provide an introductory understanding of life in the rain forest and its global implications. [ENC-001182] (See above for contact information.)

BEST COPY AVAILABLE

Learning Activities from the History of Mathematics

1994

Grades 9–12

Publisher

J. Weston Walch Publisher
Orders
PO Box 658
Portland, ME 04104-0658
Telephone: (207) 772-2846
Toll-free: (800) 341-6094
Fax: (207) 772-3105
http://www.walch.com

1 text (paperback): ISBN 0-8251-2264-3, Order # 0-22643-172 **$25.95**

Author

Frank J. Swetz

Standards

NCTM Curriculum and Evaluation Standards (1989)

Citation

Bliden, Victor J. Reviews. The mathematics teacher. *Vol. 88, No. 4, p. 354–355 (April 1995)*

For teachers interested in incorporating the history of mathematics into their classroom instruction, this book is intended to serve as a guide that they can use or modify as their situations demand. The beginning of the book provides a series of short biographies of famous mathematicians in history. These biographies are each followed by a page of questions and investigations. The next section briefly describes the history of mathematical words and contains some famous quotes. The book then moves to historical problems and classroom activities. In one activity, students examine and work with medieval multiplication methods. In another, students investigate Pascal's triangle. Each of the 21 activities is accompanied by a brief teacher's guide that explains objectives and materials needed and offers appropriate notes and suggestions. A detailed bibliography is provided at the end of the book. (Author/KFR) [ENC-006337]

Related Resources

Several resources from the *Activities Integrating Math and Science* (AIMS) series address similar issues, and ENC has a number of them in its collection:

Historical Connections in Mathematics: Resources for Using History of Mathematics in the Classroom, Volume 1
This series combines biographical information on mathematicians with mathematical activities and is designed to aid teachers in integrating the history of mathematics into their teaching. Each chapter focuses on a single mathematician and includes biographical information, quotations, anecdotes, and problem-solving activities. Illustrated worksheets, solutions for activities, and a list of resources on the history of mathematics are included in each volume. Volume 1 includes chapters on Pythagoras, Archimedes, Napier, Galileo, Pascal, Newton, Germain, and Gauss. Activities include representing whole numbers as geometric shapes, finding balance points, and predicting float lines. [ENC-000520] AIMS Education Foundation, telephone: (209) 255-4094

Historical Connections in Mathematics: Resources for Using History of Mathematics in the Classroom, Volume 2
Volume Two profiles Thales, Euclid, Heron, Hypatia, Banneker, Babbage, Galois, Lovelace, Kovalevsky, and Ramanujan. Activities focus on deductive thinking, recognizing patterns, problem solving, Heron's formula, the ellipse and the parabola, and Diophantine problems, among others. [ENC-005312] AIMS Education Foundation, telephone: (209) 255-4094

Historical Connections in Mathematics: Resources for Using History of Mathematics in the Classroom, Volume 3
In Volume 3, the mathematicians studied are Eratosthenes, Fibonacci, Descartes, Agnesi, Lagrange, Somerville, Dodgson, Venn, Noether, and Polya. Among the topics of activities are the sieve of Eratosthenes, prime numbers, Fibonacci numbers, the golden ratio, and the Cartesian coordinate system. [ENC-005311] AIMS Education Foundation, telephone: (209) 255-4094

Africa Counts: Number and Pattern in African Culture

1990

Grades 1–12

Publisher

Lawrence Hill Books
814 North Franklin Street, second floor
Chicago, IL 60610
Telephone: (312) 337-0747
Fax: (312) 337-5985
Toll-free: (800) 888-4741

1 text (paperback): ISBN 1-55652-075-1 **$14.95**

This book describes the contribution of African culture to the science of mathematics. Using numbers and patterns as organizing principles, the author describes African numeration systems, use of geometry in art and architecture, and mathematical games, all of which reveal a well-developed understanding of mathematics. Additional topics include time, weights and measures, counting, and cultural beliefs about specific numbers. The book is illustrated with graphs, diagrams, and personal anecdotes, and includes quotations from African literature and oral tradition to document the mathematical aspects of African culture. (Author/LCT) [ENC-011169]

Author

Claudia Zaslavsky; with an introduction by John Henrik Clarke

Related Resource

ENC has other resources in its collection that look at the contributions of world cultures to mathematics, including:

Asia Counts: Mathematics and Studies of Asia

This booklet is a collection of ideas for including mathematics in studies of Asia. It was put together by Tasmanian Magnet School teachers. Part One of the booklet contains 15 mathematical games from different countries of Asia. In a game called *Dapat!*, beginning Indonesian learners practice simple vocabulary while reinforcing their use of coordinates. The game board is a coordinate map where students try to guess the location of a treasure using Indonesian words for shapes, numerals, and objects. Part Two contains other activities that are not necessarily games. These activities use mathematical concepts such as space, chance, and data in studies of Asia. In one activity, students analyze temperature data of different Asian locations through graphing, writing, and answering questions. [ENC-005780] Australian Association of Mathematics Teachers (AAMT), e-mail: aamtinc@nexus.edu.au

The Dreamkeepers: Successful Teachers of African American Children

1994

Grades K–8

Publisher

Jossey-Bass Publishers
350 Sansom Street, Fifth floor
San Francisco, CA 94104
Toll-free: (800) 956-7739
Fax: (800) 605-2665
http://www.josseybass.com

1 text (paperback): ISBN 0-7879-0338-8 **$16.00**

Author

Gloria Ladson-Billings

This book is a study of how eight experienced teachers function effectively in their classrooms of primarily African American children. Presented in an informal narrative style, the study consisted of an in-depth interview on the teachers' backgrounds, their teaching strategies, their relationships with students and parents, and their disciplinary methods. For two years after the interviews, the teachers were observed on a weekly basis and videotaped while teaching. All the participants in the study then worked together to analyze the observations and look for common practices. The study identified several critical aspects of effective cultural teaching, including the teachers' conceptions of themselves and others, the manner in which classroom social interactions are structured, and the teachers' conception of knowledge. The book goes on to discuss the notions of culturally relevant teaching, classroom social interactions, literacy and mathematics teaching, and knowledge itself. The questions raised by the book include the need for Afrocentric schools, the need for and use of culturally relevant teaching materials, and ways to assimilate traditional teaching practices with culturally relevant teaching practices. By comparing traditional school programs with selected experimental programs, the book makes suggestions for improving academic performance and the school experiences of African American students. Appendices explain the methodology and context in which the study was carried out. (Author/LCT) [ENC-011192]

Related Resource

Making a Difference, Grades 5 and 6.

Part of the *Lessons from Teach for America* series, this book contains 10 lesson plans for grades 5 and 6 that have culturally diverse or English as a second language (ESL) students in mind. Teach for America (TFA) is a national teaching corps of recent college graduates who commit to teach for two years in underserved urban and rural public schools. These lessons, each developed by a TFA teacher, integrate a variety of curricular areas such as language arts, mathematics, science, social studies, multicultural studies, and music. In a sample lesson, students learn about different cultures, develop research skills, and use measurements and fractions as they collaborate to make an international cookbook. In other lessons, students examine and graph the fat content of their favorite fast foods, learn about saving and budgeting through managing an imaginary monthly income, and learn about the realities of war by reading a book about the atomic bomb that fell on Hiroshima. Each lesson plan begins with a two-page biography of the TFA teacher. Following this introduction is an explanation of how the teacher taught the lesson, including a description of materials and advance preparation. Reproducible masters and a bibliography are also provided. [ENC-011154] Creative Publications, toll-free: (800) 624-0822

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Keepers of the Earth: Native American Stories and Environmental Activities for Children

Grades K–6

1989

Series: Keepers

Publisher

Fulcrum Publishing
Suite 350
350 Indiana Street
Golden, CO 80401-5093
Telephone: (303) 277-1623
Toll-free: (800) 992-2908
Fax: (800) 726-7112
E-mail: fulcrumite@aol.com

1 teacher's guide: Order # ENC-0408 $9.95
1 text (abridged): Order # ENC-0947 $11.95
1 text (unabridged): Order # ENC-0270 $22.95

Author

Michael J. Caduto and Joseph Bruchac; illustrations by John Kahionhes Fadden and Carol Wood

This collection of Native American Indian stories and hands-on activities promotes understanding and responsible action toward the Earth and its people. Part I offers suggestions for using the stories and activities in both indoor and outdoor settings, while Part II contains 21 chapters and 63 activities. Stories and activities are arranged under broad topical headings that include agriculture and farming, astronomy, cultural studies, and ecological principles. Other topics encompass geology and soil, human relationships, life and death, and sensory awareness. For each story, the book provides background information and suggestions for extension activities. Age-appropriate activities focus on one or more of the following four areas: sensory awareness of Earth, understanding the Earth, caring for Earth, and caring for people. The teacher's guide discusses the nature of Indian myths and the cultures from which these stories come, emphasizing how the stories arose from particular North American peoples and ecosystems. It also answers questions about how and where the cultures existed, how they came to be on the North American continent, and the nature of the culture's religious practices. Maps show tribal locations of the Native American groups discussed. Also included are lists of resources for learning and teaching about North American Indians and the Earth, as well as guides to values education, story telling, puppet shows, and interdisciplinary studies. The stories are also available on cassette tape and in an illustrated story book edition. (LZ/LCT)
[ENC-000457]

Keepers of the Animals: Native American Stories and Wildlife Activities for Children

Grades K–12

1991

Series: Keepers

Publisher

Fulcrum Publishing
Suite 350
350 Indiana Street
Golden, CO 80401-5093
Telephone: (303) 277-1623
Toll-free: (800) 992-2908
Fax: (800) 726-7112
E-mail: fulcrumite@aol.com

1 text: Order # ENC-0882 $19.95

Author

Michael J. Caduto and Joseph Bruchac; illustrations by John Kahionhes Fadden, Melody Lightfeather, D.D. Tyler, and Carol Wood

This book and accompanying teacher's guide address topics of ecology and natural history through a collection of Native American stories drawn from North American cultures, such as the Inuit, Zuni, Hopi, and Cherokee. The 24 stories are arranged under broad topical headings that include creation, celebration dances, and adaptations for vision and survival. Each story is followed by a scientific discussion section that covers the taxonomy and physical characteristics of the animals in the story. This section also offers tips for observing or collecting the creatures and provides a series of discussion questions and activities. Sample activities have students monitor and record amphibian sightings in their area; make a mural of a forest, stream, field, lake, and other habitats; and solve riddles that describe the survival adaptations of some prey animals by guessing each animal's identity. Additional activities include matching games, scavenger hunts, and mazes. The teacher's guide provides an overview of the *Keepers* materials and a series of articles containing background information about multiple intelligence theory, story telling approaches to teaching, and Native American culture. (Author/LCT)
[ENC-000586]

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Grades K–9

Keepers of Life: Discovering Plants Through Native American Stories and Earth Activities for Children

1994

Series: Keepers

Publisher

Fulcrum Publishing
Suite 350
350 Indiana Street
Golden, CO 80401-5093
Telephone: (303) 277-1623
Toll-free: (800) 992-2908
Fax: (800) 726-7112
E-mail: fulcrumitea@aol.com

1 teacher's guide: Order # ENC-1870 $9.95
1 student text: Order # ENC-1862 $22.95

Author

Michael J. Caduto and Joseph Bruchac; illustrations by John Kahionhes Fadden, David Kanietakeron Fadden, Marjorie C. Leggitt, and Carol Wood

Third in the *Keepers* series, this book and accompanying teacher's guide encourage students to be field botanists as well as ecologists. Through a series of 18 stories and activities, the book provides a program of study in botany, plant ecology, and the natural history of North American plants. All North American habitats are included, from desert to seashore and from rain forest to alpine tundra. Each story is followed by a scientific discussion that covers plant taxonomy, photosynthesis and energy flow, survival adaptations, and communities. The discussions also cover such environmental issues as global warming, acid rain, and endangered species. For example, a chapter on trees begins with a Seneca invocation and proceeds to include the following topics: speech making, seasonal ceremonies, and tree identification using the senses. In another chapter, students learn that a flower is an integral part of a field and that even a vacant lot is a community of plants, animals, rocks, soils, and water. In one sample activity, students make larger-than-life models of soil fungi, roots, and other organisms that live in the soil and use these models to create a giant diarama. The teacher's guide provides an overview of the *Keepers* materials and a series of articles with background information. (Author/LCT) [ENC-008194]

Grades K–6

Keepers of the Night: Native American Stories and Nocturnal Activities for Children

1994

Series: Keepers

Publisher

Fulcrum Publishing
Suite 350
350 Indiana Street
Golden, CO 80401-5093
Telephone: (303) 277-1623
Toll-free: (800) 992-2908
Fax: (800) 726-7112
E-mail: fulcrumitea@aol.com

1 text: Order # ENC-1773 $14.95

Author

Michael J. Caduto and Joseph Bruchac; illustrations by David Kanietakeron Fadden, Jo Levasseur, and Carol Wood

Citation

Resources. Green Teacher. *Issue 40, p. 38 (October/November 1994).*

The stories and activities in this book can provide a complete program of study in the topics of astronomy, nighttime weather, and other aspects of the night sky, as well as nocturnal plants and animals from habitats throughout North America. The preface describes how some traditional Native American cultures perceive and relate to the world of night. Chapter one contains an introduction to the use of the book and additional sections that cover topics such as plants and animals in the wild and teaching racial tolerance. In chapters two–six, stories are used as introductions to 28 hands-on activities on topics such as nocturnal and crepuscular animals, nocturnal vision and sensory awareness, and animal adaptations to life in the dark. Additional stories cover nocturnal North American habitats, fears of the night world, the night sky, and story telling around the campfire. Topics are rich and varied, addressing items of interest such as Native customs, animal families, and future visions toward plants and animals. Each story is followed by a discussion section that provides background information and suggestions for activities to extend the experience. Detailed procedures and a list of materials are provided for each activity. The book includes a map showing the cultural areas and tribal locations of the Native American groups. (LZ) [ENC-000458]

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Celebrating Our Nation's Diversity: A Teaching Supplement for Grades K to 12

1994

Grades K–12

Publisher

United States Department of Commerce (USDC)
Economics and Statistics Administration
Bureau of the Census
Washington, DC 20233

1 text: ***Free (Web resource)***
1 map: ***$2.25 (may be downloaded free at the Web site below)***

Note: The full text for both the elementary and secondary editions can be found at:
http://www.census.gov/ftp/pub/edu/diversity/dearedu.html

Author

United States Department of Commerce, Economics and Statistics Administration, Bureau of the Census

This downloadable teaching supplement is designed to expose students to the diversity of the United States. Students work with real-world statistical data taken from the 1990 Census of Population and Housing. The first of the book's two teaching units consists of six consecutive lessons and is designed for elementary school. The second unit is designed for junior high and high school students and consists of five independent lessons. Included with this resource are vocabulary toolboxes, an overview of demographic concepts about diversity, four U.S. race and ethnic maps, five census questionnaire content bulletins, and a guide to additional Census Bureau resources. A sample activity asks students to develop a questionnaire focusing on diversity and conduct a classroom census, represent the data in graphs and charts, and then compare their class information with data for their state and the nation. Each lesson includes objectives, background, needed materials, procedures, and enrichment ideas. *The Curriculum and Evaluation Standards for School Mathematics* (1989) of the National Council of Teachers of Mathematics (NCTM) are emphasized throughout this resource. (Author/DDD) [ENC-002867]

Related Resource

ENC has other resources in its collection that explore the diversity of North America and how that contributes to multiculturalism in mathematics instruction:

Native American Mathematics

Designed for grades 5–12, this book offers 13 essays that describe the development of mathematics concepts in a variety of New World cultures. Information is presented from cultures as diverse as the Ojibway, the Inuit, and the Nootka in the north to the Inca and Jibaro of South America. Employing a multidisciplinary approach, the book features contributions from mathematicians, linguists, psychologists, anthropologists, and archeologists. Topics include number systems, number representations, and uses of numbers in New World cultures. Unlike modern mathematics, in which numbers and concepts are expressed in a universal mathematical notation, the numbers and concepts found in Native American cultures occur and are expressed in pictographs, hand gestures, and tallies. The book is illustrated with black and white photographs and line drawings of Native American petroglyphs, art, and architecture. An extensive list of references is provided. [ENC-011168] University of Texas Press, telephone: (512) 471-7233

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The Multicultural Math Classroom: Bringing in the World

1996

Grades 1–8

Publisher

Heinemann Educational Books, Inc.
Orders
361 Hanover Street
Portsmouth, NH 03801-3912
Telephone: (603) 431-7894
Toll-free: (800) 541-2086
Fax: (800) 847-0938
E-mail: custserv@heinemann.com
http://www.heinemann.com

1 text: ISBN 0-435-08373-2 ***$23.50***

Author

Claudia Zaslavsky

Standards

NCTM Curriculum and Evaluation Standards (1989): Content standards: Grades K–4 and 5–8; Evaluation standards: Student assessment

This teacher resource book includes eight chapters of lessons that introduce a multicultural perspective to the elementary and junior high mathematics curriculum. The book begins with a rationale for multicultural mathematics education, then describes the works of mathematics educators who are bringing multicultural perspectives into their classrooms. The lessons that comprise the main body of this text provide background information with references, suggestions for cooperative learning activities that encourage creativity and critical thinking, and advice on opportunities for open-ended, long-range projects. One lesson, "How People Use Numbers," teaches children about how numbers are used in trading within a variety of cultures, including West Africa, China, and Egypt. After learning about various systems of exchange, such as the use of wampum by the Iroquois and the use of cocoa beans by the Aztecs, students might pretend that they live in a culture that uses cowrie shells or beads for currency. This cooperative learning activity can be extended to include long-range projects such as setting up a model market place, researching forms of money used in various parts of the world, and investigating foreign exchange columns in daily news publications. Included in this book are several pages of resources, arranged into categories such as children's literature, organizations, and multicultural perspectives and equity issues. (Author/CMS) [ENC-008965]

Related Resource

ENC has all three volumes of the *TexTile Math* series in its collection, a series that integrates math with art from diverse cultures. The series covers grades K–8. A description of the first volume is included below.

TexTile Math: Multicultural Explorations Through Patterns, Grades K to 3

This teacher resource book, part of the *TexTile Math* series, contains 34 reproducible student activities that integrate mathematics and cultural art. In each of the three resource books in this series, seven cultures from around the world are represented: Colonial American, Amish, Navajo, African, Hmong, Maya, and Maori. For each activity, students create cultural designs using TexTiles, which are colorful plastic squares and triangles. They also record their creations on reproducible grid paper and solve math problems relating to the designs. The teacher page for each activity presents interesting facts about the culture, a description of the activity, and a math problem using TexTiles. A wide variety of mathematical concepts arises naturally from building the multicultural designs. These concepts range from counting, symmetry, and number patterns to fractions, logic, and tessellations. After students create Amish quilt blocks, for example, they are asked to determine the number of lines of symmetry, to build as many different blocks as possible using only yellow and red triangles, and to estimate whether or not half of the design is yellow. [ENC-009970] Creative Publications, toll-free: (800) 624-0822

Creating Culturally Responsive Classrooms

Grades K–12

1997

Publisher

American Psychological Association, Inc. (APA)
Book Order Department
PO Box 92984
Washington, DC 20090-2984
Toll-free: (800) 374-2721
Fax: (202) 336-5502
E-mail: order@apa.org
http://www.apa.org

1 text: ISBN 1-55798-407-7; Order # 4316830
$17.95

Author

Barbara J. Shade, Cynthia Kelly, and Mary Oberg

Series: Psychology in the Classroom

Developed for K–12 teachers as part of the *Psychology in the Classroom* series, this book explores the different cultures, learning styles, and behaviors of students who are identified as African American, American Indian, Mexican American, and Hmong. The series seeks to integrate theory and practice by having an academic and a practicing teacher collaborate on each book. To help teachers better engage students in the learning process, this book attempts to develop their understanding of individual differences. The guide provides information about the cultural orientations of students of various ethnic backgrounds, suggestions on promoting culturally-attuned motivational strategies, and an examination of the impact of culture on ways of learning. For each topic, the book presents cognitive and educational research findings and specific information about different ethnocultural groups. It also provides opportunities for critical thinking about the issues and ideas, as well as practical suggestions for classroom instruction. Self-assessments and bibliographic references are included. (Author/LCT) [ENC-011169]

Strategy Games of the World: Learn to Build and Apply Strategies with 3 Classic Games!

Grades K–12

1995

Publisher

Edmark Corporation
Orders
PO Box 97021
Redmond, WA 98073-9721
Toll-free: (800) 362-2890
Fax: (425) 556-8430
E-mail: edmarkteam@edmark.com
http://www.edmark.com

1 CD-ROM package (Mac/Windows): Order # 701-1069 ***$39.95***
Note: Contact publisher for additional ordering options.

Author

Geoffery Nelson, Donna Stanger, Ron Wilson, Carl Samuelson, Jim Gindling, Paul Elseth, Jesse Jones, and Tom Miller

Evaluation

Award for Creative Writing from Technology and Learning, *1996; Best Children's Software Award from* Parenting Magazine, *1996; Seal of Quality from the Family Channel, 1996; Moms' Choice Award from* Multimedia Mom, *1996*

Using games drawn from different world cultures, this CD-ROM develops strategic thinking and problem-solving skills. Building on the theory that game playing teaches students to discover patterns and sequences and break problems into smaller parts that can be solved individually, the CD uses the games to help students learn skills such as predicting outcomes, testing hypotheses, and synthesizing information. For example, in Mancala, a game popular in Africa, Asia, and the South Pacific, students use a variety of strategies to move stones around the board, attempting to collect more stones than their opponents. In Go Moku, which has been played in China for thousands of years, students try to put five pieces into a row before their opponents can. When students win, challenge levels automatically advance, or the difficulty levels of the games may be adjusted manually. Game Guide videos provide the cultural history of the games and describe their regions of origin. In the Real World Strategy video clips, problem-solving strategies used in real-world situations are described by professionals such as a movie director, a small business owner, and an astronaut. The school version of the CD includes a teacher's guide, lesson ideas, reproducible cross-curricular activity sheets, and a toll-free number for technical support services. (Author/FEB) [ENC-004699]

Grades 8–11

Multiculturalism in Mathematics, Science, and Technology: Readings and Activities

1993

Publisher

Addison-Wesley Publishing Company, Inc.
1 Jacob Way
Reading, MA 01867
Toll-free: (800) 552-2259
Fax: (800) 333-3328
http://www.aw.com

1 text with poster: Order # 0-201-29595-4
$24.00

Author

Thom Alcoze, Claudette Bradley, Julia Hernandez, Tetsuyo Kashima, Iris Martinez Kane, Gerry Madrazo, Miriam Barrios-Chacon, Alverna Champion, Martin Johnson, Alice Killackey, Beatrice Lumpkin, Realista Rodriguez

Standards

NCTM Curriculum and Evaluation Standards (1989), Content standards: Grades 5–8 and 9–12; Science for all Americans (rev. 1994)

This book is designed to help infuse multicultural education into high school science and mathematics classrooms. The authors were interested in providing math and science materials to implement the vision of a global, multicultural education. They also profile role models to inspire students to study mathematics and science, and offer assistance to teachers who need to meet state requirements for multicultural education. The book relates high school mathematics and science to real-world situations and provides materials that help teachers integrate mathematics and science. The goals were inspired in part by the *Curriculum and Evaluation Standards for School Mathematics* (NCTM) and *Science for All Americans* (AAAS). Each unit begins with a reading on the achievements of the individual or culture highlighted in the unit. Examples of individuals include Maria Agnesi, George Washington Carver, and Srinivasa Ramanujan, and the cultures studied include Egyptian, Native American, and Zuni. The reading is followed by critical thinking questions and activities that provide opportunities for group work, encourage students to make connections between science and mathematics, and frequently involve a hands-on approach. Teaching notes give specific suggestions for using the readings and activities, including background information and ideas for extensions or projects. Answers are provided for all questions. A wall chart illustrates worldwide achievements in math, science, and technology. (AM) [ENC-001354]

Grades 4–8

Math Around the World: Teacher's Guide

1995

Publisher

University of California, Berkeley
GEMS
Lawrence Hall of Science #5200
Berkeley, CA 94720-5200
Telephone: (510) 642-7771
Fax: (510) 643-0309

1 text: ISBN 0-912511-94-X ***$25.50***

Author

Beverly Braxton, Philip Gonsalves, Linda Lipner, and Jacqueline Barber

Evaluation

Field tested or reviewed at schools in the following states: AK, AZ, CA, KY, ME, MI, NY, NC, PA, TX, WA, and WI.

Developed by the Lawrence Hall of Science (LHS) Mathematics Education Program, this teacher's guide is part of the LHS *Great Explorations in Mathematics and Science* (GEMS) program for upper elementary and middle school grades. Taking nine educational math games from a range of cultures and time periods, the guide provides instructions, activities, background information, built-in assessment strategies, and literature connections. Suggested teacher activities include building on students' game playing experiences to help them develop and analyze mathematical concepts related to game theory, logic, probability, and mental math. Other targeted concepts include pattern recognition and network and graph theory. Additional activities encourage students to explore the geography and history connected to the games and to broaden their awareness of other cultures. The guide includes suggestions for presenting the games, such as hosting a festival event for the whole school or the community, or setting up classroom learning stations. (Author/GMM) [ENC-006462]

Multicultural Mathematics: Interdisciplinary, Cooperative Learning Activities

1993

Grades 5–9

Publisher

J. Weston Walch Publisher
Orders
PO Box 658
Portland, ME 04104-0658
Telephone: (207) 772-2846
Toll-free: (800) 341-6094
Fax: (207) 772-3105
http://www.walch.com

1 text: ISBN 0-8251-2181-7; Order # 021817-172
$21.95

Author

Claudia Zaslavsky

Standards

NCTM Curriculum and Evaluation Standards (1989), Content standards: Grades 5–8

This activity book contains 55 blackline masters of mathematics activities and is designed to supplement and enrich the mathematics curriculum of the middle and secondary grades. The goal is to expose students to the mathematics practices of other peoples of the world and to show students how mathematics is applied in science, social studies, art, and sports. The activities also develop the critical thinking skills of children. Each activity includes cultural, historical, or other background information and explains the pertinent mathematical concept. An optional "Think About This" section encourages further exploration of the mathematical concept and its relevance to real-world situations. One chapter is devoted to activities that develop skills for estimation, approximation, and mental arithmetic, and also give students practice determining whether results are reasonable. A brief teacher's guide includes suggestions for how to use the activities, reproducible grids, and a chart of concepts and skills that relates the book's activities to the National Council of Teachers of Mathematics (NCTM) *Curriculum and Evaluation Standards* for grades 5–8. The book includes a bibliography for multicultural and global mathematics. (Author/GMM) [ENC-003787]

Related Resource

Ethnomathematics

This book, written by Marcia Ascher, introduces readers to the field of ethnomathematics: the study of mathematical ideas as they are expressed and embedded in some traditional cultures. Some of the cultures discussed include the Inuit, Navajo, and Iroquois of North America; the Inca of South America; the Malekula, Warlpiri, Maori, and Caroline Islanders of Oceania; and the Tshokwe, Bushoong, and Kpelle of Africa. The author presents those mathematical ideas that involve numbers, logic, and spatial configuration, as well as the organization of these ideas into systems or structures. The first chapter compares the counting systems of such language groups as Nahuatl (Central Mexico), Chol (Maya), and Dioi (South China) to the recording system of the Incan quipu. Subsequent chapters describe how different indigenous peoples use sand tracings in story telling to communicate space-time relationships; entertain themselves with logic puzzles and strategy games; and use geometry to express concepts of three-dimensional space and to create patterns in art. A bibliography and an index are included. [ENC-011307] Chapman & Hall, telephone: (212) 244-3336

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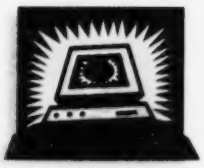
World Wide Web Sites



The Arctic National Wildlife Refuge: A Special Report
http://www.lib.uconn.edu/ArcticCircle/ANWR/

Visitors to this site can read about the the Arctic National Wildlife Refuge (ANWR) and the controversy surrounding its future. The site describes the Refuge and the issues associated with it through a series of illustrated essays that describe the natural resources within the ANWR and the native people who live there. There is also historical information on oil exploration and multiple perspectives on the debate over oil exploration in the ANWR. Views are presented from two native tribes, the U.S. Fish and Wildlife Service, and pro-development agency Arctic Power on the issue of natural resource utilization. Additional links provide information about the culture, history, and beliefs of the Inupiat and Gwich peoples that live on the ANWR. [ENC-001818]

An Amazon Adventure
http://168.216.210.13/amazon/index.htm

Developed for grades 6–12, this Web site invites visitors to explore a small portion of the upper Amazon through text and photographic images. The site describes the results of a 1996 trip to the Amazon and includes additional information developed by students from elementary, junior high, and high schools. It features picture essays about the Amazon River and the indigenous people, plants, and animals of the tropical rain forest. Visitors are invited to submit artwork, research or other materials for possible inclusion, as well as questions and opinions. [ENC-011148]

National Indian Telecommunications Institute (NITI)
http://numa.niti.org/

The Native founded and run organization in Sante Fe, New Mexico, strives to employ advanced technology to serve American Indians and Alaska Natives. Areas targeted include education, language and cultural preservation, and self determination. The site provides information on training facilities and classes offered at the NITI computer laboratory in Sante Fe. Information is available on NITI's internship program for American Indian and Alaska Native students. The Native American Web Pages section gives links to sites on Native languages, music, organizations, and tribal information. Also supplied are links to organizations affiliated with NITI, including the National Science Foundation, Los Alamos National Laboratories, and the Prairie View A&M University's Network Resources Training Site. [ENC-009992]

Mancala
http://imagiware.com/mancala/

This Web site is a computer version of the ancient African game Mancala, also known as Kalaha. The physical game board has 12 playing pits, each containing 3 seeds. Each seed in the pit is then placed, one at a time, into successive pits, moving counterclockwise around the board. Points are earned by placing seeds in a scoring pit. The game ends when all of the pits on one side of the board are empty. There are two difficulty levels available, as well as a hint button that suggests moves for the player. [ENC-004050]

Varieties of Multicultural Education: An Introduction
http://eric-web.tc.columbia.edu/digests/dig98.html

This ERIC/CUE (Clearinghouse on Urban Education) Digest article classifies multicultural education programs into three broad groups: content-oriented, student-oriented, and socially-oriented. The content-oriented programs attempt to infuse information about different cultures into the curriculum. Student-oriented programs address the academic needs of different groups by offering special programs based on different learning styles. The programs that seek the broadest reform are the socially-oriented; these aim to reform both schooling and the cultural and political contexts of schooling, thereby increasing cultural and racial tolerance and reducing bias. [ENC-011553]

Multicultural Pavilion
http://curry.edschool.Virginia.EDU/go/multicultural/

Developed for K–12 educators, this Web site offers resources about multicultural education and provides a forum for online discussion. The site features an article that describes the concept of multicultural education, including a working definition, components, and goals. The Teacher's Corner provides online resources for teachers, including reviews of children's music, multicultural activities, and online literature archives. In the Research and Inquiry section, users can find research resources such as statistical data archives, online article archives, and links to online libraries, electronic journals, and research organizations. Classroom discussion activities are provided to heighten multicultural and diversity awareness. The site also includes a collection of online networking strategies, Web tutorials, and links to other multicultural sites. This site has been named a Magellan 3-Star site and has been a weekly selection of Suite 101. [ENC-011209]

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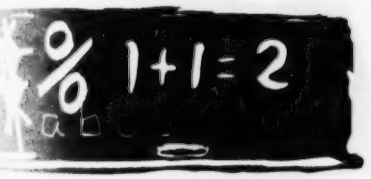
In the Classroom with ...

Petra Martinez



Garden Variety Science

by Julia L. Harris
ENC Publications Team

At the Jesse Sanchez Elementary School in Salinas, California, a flourishing and well-tended garden is yielding much more than just fruits and vegetables: it is raising up a harvest of enriched science and language learning and cultural validation for the mostly Hispanic students who work and learn there.

The school has been participating for the last three years in a local systemic change initiative called LASERS (Language Acquisition in Science Education for Rural Schools). Funded by the National Science Foundation, the program combines science instruction and English as a Second Language (ESL) in a way designed to make science relevant to the students and to honor the students' primary language. "Research on second language learning is telling us it's important to make ESL instruction content-based so students start developing academic language and can be successful in using a second language within the school context," explains Roberta Jaffe, Project Director.

Elementary students admire the plants in their garden

Linking English and Science

In addition to its involvement with the LASERS project, the Sanchez school recently adopted a new English program that incorporates many science themes, so it dovetails perfectly with the Life Lab Science Program, the science curriculum used by LASERS. Petra Martinez, a kindergarten teacher and co-director of the school's K–6 computer lab, is excited to be part of the LASERS project. She credits it and its use of the Life Lab curriculum with instilling a new appreciation for science and learning in her students. "The students are learning more quickly, and they're enjoying it. English and science are kind of the same thing for them and it's their favorite subject," she says.

One of the greatest benefits Martinez sees in the program is the high priority it places on professional development. Although not every teacher is part of the LASERS project, all are encouraged to bring questions and problems to the LASERS staff developer who comes to the school twice a month. Those teachers who are involved in the project have been sent to workshops, and this past summer participated in a program that focused on effectively implementing the Life Lab curriculum.

Fostering Biculturalism

Martinez's involvement with LASERS is only one way she seeks to create an environment that nurtures learning. Well acquainted with the sense of marginalization that students of color can experience in a traditional classroom, she works diligently to make her students feel honored for who they are. In keeping with the school's recent decision to foster biculturalism—which means that students learn about mainstream American culture as they receive instruction that is sensitive to their own culture—Martinez incorporates multicultural celebrations into her classroom to give all students a sense of inclusion. "For Chinese New Year, we have a big parade," she says. "And we have assemblies and other celebrations. Basically, we just try to include students and make sure they feel welcome and that their culture and language have been validated."

This atmosphere of cultural acceptance, Martinez notes, seems to have given her students a sense of comfort with learning that she herself did not experience. From her own background, she describes how alienated she would feel when her teachers would quiz her on what she did for holidays: "Thanksgiving meant nothing for us, because we didn't understand it. I didn't eat turkey—we ate something else. But it just seemed like the teacher assumed everybody was going to celebrate," she says. "I don't do that. I try to let the kids have the freedom to express themselves, and I never say anything is wrong or bad."

Given that most of her students are of Mexican heritage, providing the freedom for them to express themselves often means that Martinez conducts some portions of the lessons in Spanish. When she taught high school, she did a great deal of work with ESL students, and she believes that bilingual instruction gives children the self-esteem they need to be able to ask questions.

Martinez's own personal interest in cultural validation and language acquisition, combined with her love of science, are the motivating factors behind her involvement with the LASERS project. "I think that one of the biggest benefits we wanted to see—and we are seeing—is that LASERS would serve as a vehicle to help kids learn English more quickly," she says. "Science is such a natural thing; it's all about letting kids be inquisitive and explore and investigate. It's just so fun."

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Section III: Articles and Related Resources

Most of the following articles can be found on ENC's new Equity CD-ROM. You can also look online at URL http://www.enc.org/equity, in the Equity Materials Section. In addition, a search on the ENC number in ENC's Resource Finder will give you the exact URL and a link to the article.

An Indian Father's Plea

Robert Lake

Robert Lake, a Native American parent and educator concerned that his kindergarten son has been labeled a slow learner, wrote this article as a letter to his son's teacher describing his son's early, informal education. Lake points to social and cultural differences that are causing the child to become ashamed of his native culture. Concerned about the long-term effects of early discrimination, he offers to direct the teacher to resources for educating culturally different children. [ENC-009746] *Teacher Magazine*, p. 49–53, 1997

Charting New Maps: Multicultural Education in Rural Schools

Jenny Penney Oliver and Craig Howley

This article considers the relevance of multicultural education for rural schools in which neither ethnic nor cultural diversity is great. According to the authors, multicultural education seeks to create an environment in which students understand, respect, and ultimately value cultural diversity. Strategies are suggested for reducing cultural isolation in rural schools and for adapting practices to accommodate local needs. [ENC-009652] *ERIC Digest*, August 1992 [ERIC Clearinghouse on Rural Education and Small Schools]

Teaching Science to English Learners, Grades 4 to 8

Ann K. Fathman, Mary Ellen Quinn, and Carolyn Kessler

This guide helps teachers plan, design, and implement science activities for students learning English as a second language. It presents teaching strategies and suggests steps for designing science experiences that effectively integrate language and science. By integrating the teaching of science with language learning, students who are learning English may learn scientific inquiry processes, English vocabulary and structures, and social interaction skills. [ENC-002133] *NCBE Program Information Series, Guide 11*, 1992 (available online at http://www.ncbe.gwu.edu/ncbepubs/pigs/pig11.html)

Schools Where Speaking Spanish Is an Asset

Harvard Education Letter

A team of researchers identifies six exemplary practices at several high schools serving large populations of Latino students in California and Arizona. All the schools place great value on the students' native language and culture and treat the ability to speak Spanish as an advantage, not a liability. Students are encouraged to take advanced placement Spanish courses to earn college credit for skills in their native language. The schools also provide a range of support services, including tutorials and extended learning time, before or after school counseling with bilingual staff, mentoring, and advocacy. [ENC-009497] *Harvard Education Letter*, vol. 7, no. 6, November/December 1991

Kids Who Speak Spanish: Schools That Help Them Learn

Adria Steinberg, editor

The two studies described in this article conclude that Latino students have greater linguistic and intellectual competence than they demonstrate in a typical classroom. The first study analyzed the performance of four low-achieving students and found that they seemed slow and hesitant in class because, although they were in a bilingual program, Spanish was not treated as a legitimate language for academic work. In the second study, researchers questioned students in Spanish about material they had just read in English. They also developed a unit in which students worked with parents and community leaders to build a model of their town. In the process, students read books, interviewed community members, and worked collaboratively to share what they learned in both written and oral accounts. [ENC-009620] *Harvard Education Letter*, vol. 7, no. 6, November/December 1991

Working with Native American Children

Lee Little Soldier

The author details his observations on Native American children's performance in classrooms operated by Native American tribes as compared with their performance in public school classrooms. He discusses cultural and value differences on dichotomies such as group versus individual and cooperativeness versus competitiveness. He also explores traditional Native American indifference to acquiring material goods and what educators can do to avoid stereotyping Native American families. The goal is to help teachers ensure that Native American children succeed in public preschools and elementary schools. [ENC-009650] *Young Children*, vol. 47, no. 6, September 1992 (p.15–21)

Creating a Multicultural Learning Environment in Science Classrooms

Alejandro J. Gallard

Science teachers can read this article to discover ways to encourage learning by facilitating students' use of extant knowledge, which includes culture and language, in a multicultural setting. The article argues that the complexity of a multicultural classroom is compounded by the fact that the discipline of science has its own culture and language, and so does the science teacher. The author recommends that educators facilitate learning by providing students with opportunities to make sense of science phenomena through diverse, multisensory experiences. [ENC-009619] *National Association for Research in Science Teaching (NARST)*, no. 29, March 1992

World Cultures in the Mathematics Class

Claudia Zaslavsky

In this article, Zaslavsky demonstrates some of the cultural differences in the mathematical perspectives of Native Americans, African Americans, and Latinos. Because they had less access to educational opportunities during their preschool years, many of these children are placed in the lowest track, where they are usually presented with an outdated curriculum, taught by rote memorization methods, and tested by standardized paper and pencil, multiple choice tests. The author notes that the introduction of multicultural, interdisciplinary perspectives into mathematics can help students become aware of its role, appreciate the contributions of different cultures and their own, and link math with history, language arts, fine arts, and other subjects. [ENC-009651] *For the Learning of Mathematics*, vol. 11, no. 2, June 1991 (p. 32–36)

Issues in Cross-Cultural Assessment: American Indian and Alaska Native Students

Elise Trumbull Estrin and Sharon Nelson-Barber

With a view to identifying strategies for improving educational outcomes, this article explores some of the historical and sociocultural factors that have affected the schooling of American Indians and Alaska Natives. It focuses primarily on assessment issues for native students, pointing out that their test performances can be affected by inappropriate content that assumes common experiences. These tests also tend to rely on verbal information and representation to the near exclusion of nonverbal, visual information. The authors recommend that teachers employ learning and assessment strategies that are compatible with native culture, such as hands-on, experiential learning and alternative assessments that include cooperative group work. [ENC-009759] *Knowledge Brief* [Far West Laboratory], no. 12, 1995

People Who Live in Round Houses

Claudia Zaslavsky

Written for K–6 teachers, this article presents a framework for a multicultural lesson in geometry. By investigating styles of buildings in different cultures (tipis, igloos, huts), students can gain valuable experiences with shape, size, perimeter, and area. The text features pictures of buildings from a variety of cultures, suggestions for class discussions, and a lesson plan that focuses on area and perimeter. Students are asked to construct plans for building a house that uses the least amount of material and provides the largest floor space, ultimately reaching the conclusion that round houses achieve the greatest possible floor space with a given quantity of building materials. [ENC-009739] *Arithmetic Teacher*, September 1989 (p. 18–21)

More than Beads, Buckskins, and Bolo Ties: The Role of Culture in Science

Frank C. Dukepoo

Dukepoo, writing to teachers of all grade levels, discusses the need for programs that teach science and mathematics to ethnic minorities. The main impediment to the success of these programs, Dukepoo posits, is unmotivated teachers with preconceived ideas as to the capabilities of the students. He states that although programs are needed, we must focus not on cultural relevance, but on the human spirit within each individual. [ENC-009680] 1993 conference paper from Southwest Educational Development Laboratory

Asian American Children: What Teachers Should Know

Jianhua Feng

To help teachers gain a better understanding of Asian American children and to identify culturally appropriate educational practices to use with them, this article debunks some of the prevailing stereotypes educators may have. The author warns that the image of the Asian American "whiz kid" and the stereotype of the model minority are misleading because they mask individuality and conceal real problems. Also discussed are cultural differences between America and Asian countries that may affect Asian American students' involvement in the classroom. Feng presents practices teachers can adopt to help Asian American children, such as familiarizing themselves with the values, traditions, and customs of various cultures and basing academic expectations on individual ability rather than on stereotypes. A list of articles for further reading is provided. [ENC-009581] *ERIC Digest*, June 1994 [ERIC Clearinghouse on Elementary and Early Childhood Education]

Multicultural Education: Development, Dimensions, and Challenges

James A. Banks

This article addresses misconceptions about multicultural education that have overshadowed the progress that has been made during the last two decades. One such misconception is the idea that multicultural education is a curriculum movement for others, such as African Americans, Hispanics, women, and other victimized groups. Banks argues that the movement is designed to benefit all students, including white, middle class males. The article also discusses progress in multicultural education, pointing out the increase in ethnic content in textbooks and the inclusion of multicultural courses in teacher education. [ENC-009767] *Phi Delta Kappan*, September 1993 (p. 22–28)

The Education of Linguistically and Culturally Diverse Students: Effective Instructional Practices

Eugene E. Garcia

In this paper, Garcia summarizes research on educationally effective practices used with linguistically and culturally diverse students in selected areas in the United States. These descriptive studies identified specific schools and classrooms whose Latino, American Indian, Asia, and Southeast Asian language minority students were academically successful. The studies identified a number of common attributes, including an emphasis on functional communication between teachers and students and among fellow students; thematic organization of instruction of basic skills and academic content; and systematic progression from having students write in their native language to writing in English. The author concluded that effective practices utilize instructional strategies that acknowledge, respect, and build up the language and culture of the home. [ENC-009760] 1991 report from National Center for Research on Cultural Diversity and Second Language Learning

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In the Classroom with ...

Alice Lopez

Building a Culture Quilt

by Julia L. Harris
ENC Publications Team

Alice Lopez, a veteran teacher with almost 18 years of experience, calls herself a "born-again" mathematician and scientist. Her description seems fairly accurate when you look at the almost missionary zeal she brings to her current position, a one-year term with the Colorado Department of Education as the Eisenhower Math/Science Equity Programs Consultant.

Initially brought on board to provide support for facilitating programs such as Family Math, Family Science, and GEMS, Lopez has spent most of her time traveling around the state helping districts and schools design programs that serve limited English proficient and special needs students. She has also been active with the Title I program and has worked extensively with migrant parents, helping them to become empowered and proactive in their children's education. She is currently working to send a core group of these parents out to California for some formal training, so they can return to their own communities and pass on what they have learned.

It is an exciting and challenging position, and Lopez is encouraged by the work she is doing. And yet, her heart belongs to a suburban school in Thornton, near Denver, where a classroom of bilingual, special education first graders waits for her return. "Even as I think about them, I picture their faces and names, and I get all warm and fuzzy," she says. "We work very, very hard; I have very high expectations of all my students, and I know that they are capable of doing great things."

The Ties that Bind

Western Hills Elementary serves approximately 600 K–5 students. The mobility rate is high, and the student population is diverse: Lopez estimates a minority population of 36%, which includes Native American, Hispanic, African American, and Asian. Add to these figures a class of bilingual special education students, and Lopez has her share of challenges. Judging from her recent acceptance of a Milliken Award, an honor bestowed on four teachers each year based on their commitment to education, she is more than able to meet that challenge.

"I really do believe that the best way to educate the children is to keep them all as involved in the 'mainstream' as possible," she explains. "I think children can really learn from one another. We all have strengths and we all have weaknesses, and I think that if we can build a kind of family environment, then we all can learn and benefit from that experience."

Building that environment begins from day one, when she reads from the book *Who Belongs Here: An American Story* by Margy Burns Knight and Anne Sibley O'Brien. After reading the story, Lopez invites the children to talk about where they come from and where their roots are. She then sends them home with an 8x10 piece of construction paper and instructions to have their parents help them create a picture describing their history and who their ancestors were, including any personal stories or historical facts. "I've had some beautiful artwork turned in on those little pieces of construction paper," she notes. "As the students bring them in, we use a three-hole punch and actually piece them together, like a quilt. That becomes our display out in our hall, so that everyone can see who we are and where we came from."

In addition to this "culture quilt," Lopez and her students make a variety of different quilts throughout the year and use them to learn patterning, colors, and other activities. The quilts can easily be integrated into many instructional settings, and the children enjoy the fact that the focus is on them. "The children are my natural resources," Lopez relates. "We use our selves as the theme of whatever topic we're writing about. Whenever possible, I try to get Polaroids of them—I've found that any time you can get a picture of children in their interactions, it always makes for a lot of discussion." She laughs, "I have a small fortune invested in Polaroid!"

Modeling Success in Math and Science

Not only do the children see reflections of themselves in the many photographs taken of them, but they also have the opportunity to see themselves in the role models Lopez brings in from the business and professional community. "I intentionally seek out people of color or ethnic minority, so the children can begin to envision a possible future for themselves," she says. "When I bring in the role models, I specifically ask them to tell the kids how they use math or science in their everyday job, and some of the obstacles they had to overcome in order to pursue their career goals."

The end result of these visits is that children no longer ask Lopez why they are being asked to participate in math and science activities. They no longer wonder when they are going to use the skills they are being taught, because they now have a frame of reference as to how that knowledge can have practical application in the real world—by people who look like they do.

One of the most exciting results of using a multicultural approach in math and science is the increased level of respect and collaboration between students. Lopez has noticed that the children have begun to assume responsibility not only for their own learning, but have also been taking a more collaborative role in the learning of others. "I think that any time you can validate to children who they are, what talents they possess, what knowledge and information they have to share, it enhances everyone's learning," Lopez notes. "That's how we build mutual respect. The more we can show children that we respect and honor the talents they have, the better off we all are."

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Section IV: Multicultural Videos and Children's Books

The videos and trade books on the following pages are just a sample of the many available for use in your classroom. The description of each tape and book includes the name of the author/director, the name of the distributor, and the toll-free number at which you may contact the company. To find more information about these resources and others that we have in our collection, visit ENC Online (http://www.enc.org/) and search our database, Resource Finder. See page 2 for more details on searching ENC's collection.

Videos

The Sun Dagger (1982)
Produced by Anna Sofaer; directed and edited by Albert Ihde

The Anasazi Indians created a celestial calendar more than a thousand years ago, and this video for grade 7 and up explores the unique nature of the calendar and the Indians who created it. [ENC-004326] Bullfrog Films, Inc., toll-free (800) 543-3764

Kings of the Jungle (1992)
Edited, produced, and directed by Chris Christophe

The focus in this video for grade 10 and up is the Amazonian rain forest and its inhabitants. The program retraces the expedition of Brazilian explorers Claudio and Orlando Villas Boas, and describes the cultures of the indigenous people who were affected by the arrival of outside interests. [ENC-004383] Bullfrog Films, Inc., toll-free (800) 543-3764

Haida Gwaii, the Queen Charlottes: Islands in the Web of Life (1989)
Produced and directed by Barbara Barde

For grade 7 and up, this video describes how the Haida people of British Columbia's Queen Charlotte Islands have enjoyed the island's natural resources for thousands of years and how they are now dealing with the same social and environmental problems faced by so many nations around the world. [ENC-004348] Bullfrog Films, Inc., toll-free (800) 543-3764

Spirits of the Yellow Leaf People (1992)
Directed by Malin Pongsapipatt

This program, designed for junior high and up, documents the lifestyle of a nomadic tribe of people living in the diminishing rain forest of northern Thailand. It shows how their culture and habitat are being threatened by the advancement of modern technology and its disregard for their way of life. [ENC-004888] Chip Taylor Communications, toll-free (800) 876-2447

Tram Chim: Pearl of the Mekong Delta (1996)
Produced by Steve Braker

Tram Chim, a wetland area in Vietnam's Mekong Delta, was devastated by chemical and hydrological disturbances during the Vietnam War. This video, developed for grade 7 and up, focuses on conservation efforts to save the wetlands, emphasizing the interdependency of human and natural communities. The video is mostly in Vietnamese, with English subtitles. [ENC-008364] Chip Taylor Communications, toll-free no: (800) 876-2447

Still Life for Woodpecker? (1992)
Produced, written, and directed by Francis Paynter

This video, developed for grades 5–12, uses a native myth about woodpeckers to examine the issue of North America's deforestation. In the myth, Yamakpah is the pileated woodpecker sent to the Earth to watch over and protect the human species. The video discusses how scientists have begun to use pileated woodpeckers as indicator species to judge the health of a forest. [ENC-004427] Bullfrog Films, Inc., toll-free (800) 543-3764

River Spirits (1995)
Directed by Arthur Twomey

Two kayakers take a journey of more than 60 miles through the undivided wilderness of the Purcell Wilderness Conservancy in southeastern British Columbia. The video, for grade 7 and up, documents their travels, incorporating the Ktunaxa creation myth in its study of ecosystems and conservation biology. [ENC-004430] Bullfrog Films, Inc., toll-free (800) 543-3764

Blowpipes and Bulldozers: The Story of the Penan Tribe and Bruno Manser (1988)
Produced and directed by Jeni Kendell and Paul Tait

After 40,000 years of living within the Malaysian rain forest of Sarawak, Borneo, the nomadic Penan tribe is being logged out of existence. In this video, students in grade 9 and up learn how a man named Bruno Manser has helped the Penan publicize their plight. The video also describes the Penan history, hunting habits, habitat, and simple lifestyle. [ENC-004396] Bullfrog Films, Inc., toll-free (800) 543-3764

Books

Amazon Diary: The Jungle Adventures of Alex Winters (1996)

Hudson Talbott and Mark Greenberg

This fictional diary of a 6th grade boy describes his two-week stay with the Yanomami tribe in the Amazon jungle. Suitable for grades 3–8, this book features drawings and color photographs of the Yanomami and describes the types of food that they eat, their housing, and some of their social activities. [ENC-010282] Putnam & Grosset Publishing Group, toll-free (800) 631-8571

The Story of Money (1994)

Carolyn Kain; illustrated by Gerry Wood

Tracing the historical evolution of money, this book for grades 1–4 discusses bartering, the use of precious objects for money, and the first coins. It also examines countries without money, the evolution of paper money, modern banks, taxes, and future uses of money. [ENC-001294] Troll Associates, toll-free (800) 526-5289

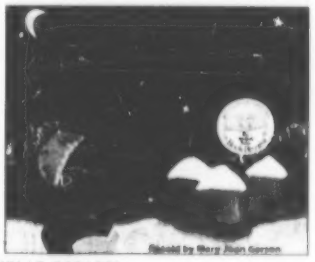
In the Heart of the Village: The World of the Indian Banyan Tree (1996)

Barbara Bash

Set in a village in India, this story tells students in grades 1–5 about the significance of the banyan tree to the villagers, who believe this tropical species of tree is sacred. Illustrated in watercolors, the story highlights the interconnectedness of life in this rural culture. [ENC-008505] Little, Brown, toll-free (800) 759-0190

Why the Sky Is Far Away: A Nigerian Folktale (1974)

Retold by Mary-Joan Gerson; illustrated by Carla Golembe



This traditional Nigerian folk tale, retold for K–6 students, is illustrated with brilliantly colored monotypes that depict the African landscape, as well as the traditional dress and the daily activities of the people. Winner of Best Illustrated Children's Book from *The New York Times Book Review*. [ENC-009699] Little, Brown, toll-free (800) 759-0190

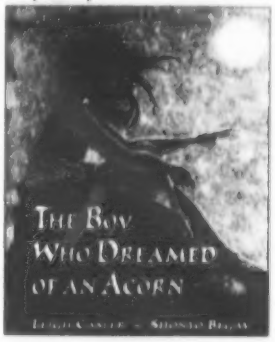
The Sierra Club Book of Weather Wisdom (1995)

Vicki McVey; illustrated by Martha Weston

Readers in grades 4–6 will learn how to predict the weather by paying close attention to weather signs, such as wind, clouds, and animals' behavior. Dramatic stories, pencil illustrations, and hands-on activities explain how the Earth's rotation and its orbit around the sun are linked to the seasons and climate. [ENC-007703] Little, Brown, toll-free (800) 759-0190

The Boy Who Dreamed of an Acorn (1994)

Leigh Casler; illustrated by Shonto Begay



Written for pre-K through grade 3, this story is based on a Native American rite known as the spirit quest. A young Chinook boy climbs a mountain and has a dream of an acorn, a dream that a wise man helps him interpret. In addition to the narrative, the text provides a glossary of Chinook language terms. [ENC-007525] Putnam & Grosset Publishing Group, toll-free (800) 631-8571

Tree of Life: The World of the African Baobob (1989)

Barbara Bash

Students in grades K–5 can read about the African baobob tree and the interconnection of life on the African savannah. Leafless and bare for much of the year, the baobob helps support a rich variety of life and is called "mother" by the African people. [ENC-007491] Little, Brown, toll-free (800) 759-0190

Native American Scientists: Fred Begay, Wilfred F. Denetclaw, Jr., Frank C. Dukepoo, Clifton Poodry, Jerrel Yakel (1996)

Jetty St. John

Short biographies describe the early lives and vocational inspiration of five Native American scientists, including Frank C. Dukepoo, the first Hopi to earn a doctorate in science. Written for grades 4–8, the book also highlights the major accomplishments of Fred Begay at the Los Alamos National Laboratory. [ENC-010083] Capstone Press, toll-free (800) 747-4992

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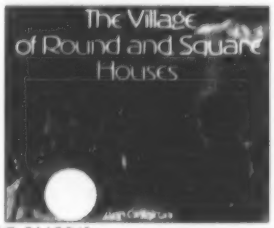
The Village of Round and Square Houses (1986)

Ann Grifalconi



This picture book for grades 2–8 describes a village in the remote hills of the Cameroons in Central Africa, where the men live in square houses and the women live in round houses. Large, colorful paintings depict the customs and dress of the people and the lush vegetation. Caldecott Honor Book, 1987. [ENC-011206] Little, Brown, toll-free (800) 759-0190

Native American Stories (1991)

Told by Joseph Bruchac; illustrations by John Kahionhes Fadden

Part of the Keepers of the Earth curriculum series for grades K–6, this book addresses ecology and natural history through a collection of Native American myths drawn from the native cultures of North America, such as the Inuit, Zuni, Hopi, and Cherokee. [ENC-007696] Fulcrum Publishing, toll-free (800) 992-2908

Hispanic Scientists: Ellen Ochoa, Carlos A. Ramirez, Eloy Rodriguez, Lydia Villa-Komaroff, Maria Elena Zavala (1996)

Jetty St. John

This book, designed for grades 4–8, presents biographies of five Hispanic American scientists, including Ellen Ochoa, the first Hispanic American woman astronaut. A glossary of terms, a list of resources, and addresses of related professional groups are also provided. [ENC-010081] Capstone Press, toll-free (800) 747-4992

Fun with 9umbers (1995)

Written by Massin; illustrated by Les Chats Peles

This book for grades 1–4 combines descriptive illustrations and facts about the different ways we count, measure, write out numbers, and solve number problems. The Mayan and Egyptian number systems, for example, are used to demonstrate how people first began to count. [ENC-006221] Harcourt Brace Jovanovich, toll-free (800) 225-5425

Thirteen Moons on Turtle's Back: A Native American Year of Moons (1992)

Joseph Bruchac and Jonathan London; illustrated by Thomas Locker

This illustrated anthology of Native American poetry celebrates the seasons of the year through poems based on the legends of 13 tribes such as the Cherokee, Potawatomi, Seneca, and Menominee. The verses are presented in the context of a story in which a young boy observes that the 13 scales on Turtle's back correspond to the 13 moons of the Native American calendar. [ENC-004503] Putnam & Grosset Publishing Group, toll-free (800) 631-8571

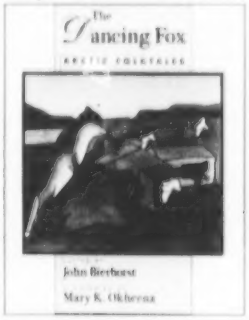
Eco-Women: Protectors of the Earth (1996)

Willow Ann Sirch

Written for grades 2–9, this book contains brief biographies of nine women who have made lasting contributions to the world environmental movement. The women profiled include Rachel Carson, who was interested in hawks; Marjorie Stoneman Douglass and her work with Florida panthers; and Wangari Maathai and the movement she began to plant trees in Kenya. [ENC-004793] Fulcrum Publishing, toll-free (800) 992-2908

The Dancing Fox: Arctic Folktales (1997)

Edited by John Bierhorst; illustrated by Mary K. Okheena



This collection of Inuit folk tales, designed for grades 1–8, provides insight into the Inuit culture and the difficulties of living in the Arctic environment. Many of the stories, such as "The Woman Under the Sea" and "The Girls Who Wished for Husbands" involve animals and animal spirits interacting with humans. [ENC-011152] William Morrow & Company, toll-free (800) 843-9389

In the Classroom with ...

Clara Southerland

Multicultural Education: Not Just a Fairy Tale

by Julia L. Harris
ENC Publications Team

At first glance, Yale, Oklahoma, may not be the kind of place that comes to mind when the issue of multicultural education is raised. Nestled between the larger cities of Tulsa and Stillwater, Yale is a rural community with a population of approximately 1,500; its elementary school serves a largely white student body, more than half of which qualifies for free or reduced price lunches. The whole question of multicultural education might even seem irrelevant for these children—except, perhaps, to third-grade teacher Clara Southerland.

"It's so important to have some basic understanding and respect for different cultures," she says. "Students need to have exposure to the differences among people, and to celebrate those differences. They need to know that, while we are different, there are so many things about us that are basically the same: family, the things we value as a culture."

Cinderella Goes to School

Southerland meets the challenges posed by her non-diverse classroom by taking something with which all of her students are familiar—the Cinderella story—and showing how this myth is treated around the world.

Students practice sorting their shoes

"Every culture in the world has some sort of a Cinderella story," she notes. "What I do is read the stories with the children and then we discuss what is the same and what is different."

The oldest story, it turns out, originated in China, while the one many people think of—the "Disney version"—actually comes from France. In all the stories, the theme remains fairly constant: there is a main character who is basically good but who is gravely mistreated by those around her, and who in the end is identified and rescued through some sort of magical item, such as a ring or a shoe. There are even Cinderella stories, such as the one from Ireland, where the main character is a boy rather than a girl—a fact that Southerland's male students particularly enjoy. "It amazes my students—and it amazes adults when I do presentations to teacher and parent groups—about how many different Cinderellas there are in the world," she laughs.

Building on the interest generated by the multicultural Cinderella stories, Southerland has created a unit she calls "Cinderella: The Clue in the Shoe," in which the children bring in shoes from home and use them in a variety of math and science activities. The types of shoes the students bring in can vary—some bring in baby shoes, while others bring track shoes—but all the shoes have a story to tell, and the children sit in a circle and share those stories with one another.

"Then I have them put the shoes in a pile and one of the children sorts them by attributes," Southerland says. "We create Venn diagrams with them, and they measure with them and graph them. We trace the shoe on 1-inch graph

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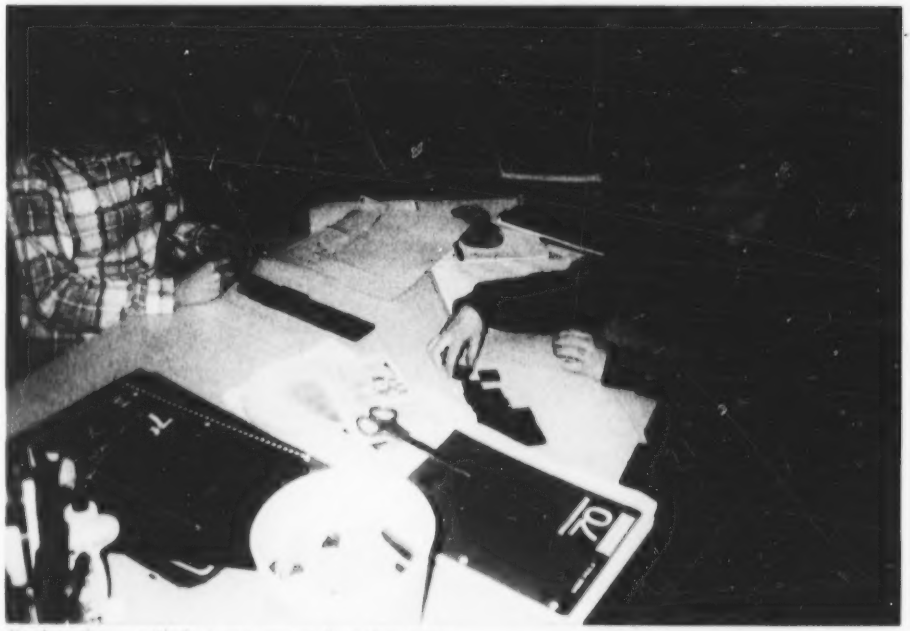
paper, find its area, and look for different shapes and forms that would have the same approximate area. We also find the proportion of approximate shoe lengths to the student's height."



Finding shapes with the same area as their shoe prints

The Cinderella theme reaches into science learning as well. Students read Karen Louisa Batt's book *On Your Feet*, which talks about how the kinds of shoes people wear are determined in part by the work that they do and by the resources available to them. The class also takes a look at animal tracks, determining what the tracks indicate about the kind of animal that made them.

For older children, as well as for the teacher workshops she leads, Southerland has developed a mystery based on shoe prints. "I leave footprints around the room and tell them that someone broke in and stole something," she explains. "The only clues they left behind are their shoe prints and a shoe. They try to determine if the person was walking or running, how tall the person was, things like that. A lot of them put their own feet over the footprints and decide how tall the person was by comparing it with themselves, which is 'using prior knowledge' and all those skills you want children to develop."

Passport to a Bigger World

Southerland takes many opportunities to explore multicultural themes in her teaching. Earlier this year, her class was interested in studying volcanoes, so she introduced them to the volcanoes of Hawaii and the cultural legend of Pelee, the goddess whose anger was believed to cause the mountains to erupt. Future plans for the class include a unit on the Pacific Rim, an area her class seemed interested in after the school's annual multicultural open house.

As a result of incorporating multicultural themes into many areas of the curriculum, Southerland says she has noticed a greater sensitivity in her students, particularly in how they interact with one another. "It happens in many small ways," she muses, describing a situation in which a student brought in Halloween candy for the class and made special allowances for a classmate who was a Jehovah's Witness. "The treats were in decorated bags, so he took the candy out of the Halloween bag and put it into a plain one so that this girl could have it."

In another example, she cites how the students bring a broader cultural perspective to their reading: "I hear them making connections, saying 'Look how those people felt in that situation,' and how they were made to feel less of themselves as humans—and how they rose above that."

Multicultural Approaches in Math and Science

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